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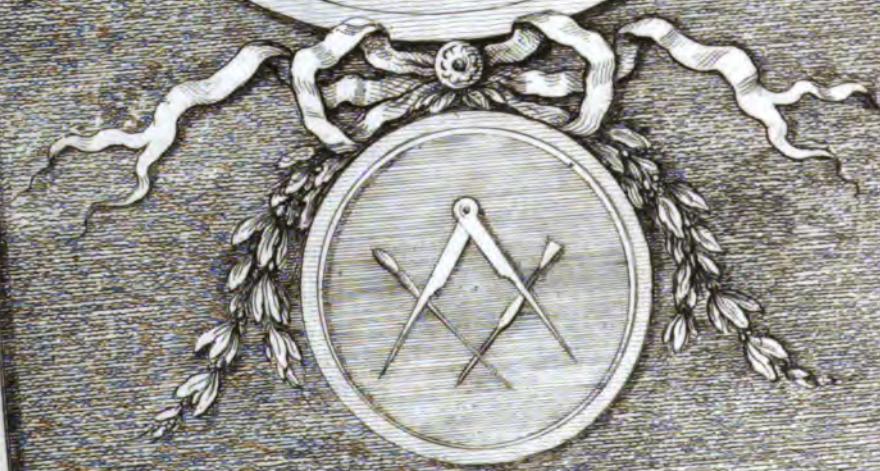








TANTO CHE BASTA.



*E. B. delin. et fecit Aq. Fort.  
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A  
PRACTICAL TREATISE  
OF  
P E R S P E C T I V E,  
ON THE PRINCIPLES OF  
DR. BROOK TAYLOR.

---

BY  
EDWARD EDWARDS,  
ASSOCIATE AND TEACHER OF PERSPECTIVE  
IN THE  
*Royal Academy.*

---

Pamphilus—primus in Picturâ omnibus literis eruditus, præcipue  
Arithmetice et Geometrice, sine quibus negabat Artem perfici  
posse. *Plin. Nat. Hist. ed. Gron. Lib. 35. C. 10.*

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TO THE  
K I N G.

SIR,

AS it is principally by the patronage of Your MAJESTY, that the polite Arts have been raised to their present state of prosperity in the British Empire, I am induced to hope that any, the humblest attempt towards their further cultivation or improvement, will not be deemed unworthy of Your MAJESTY's favour. It is from this persuasion, that I am encouraged to present to Your

---

MAJESTY, the following Treatise, on the science  
and practice of Perspective.

That Your MAJESTY may long be enabled to  
continue to the Arts, that patronage and protec-  
tion, under which they have hitherto flourished ;  
and may thence derive the satisfaction which  
must result from private gratitude and public  
esteem ; is the humble, but ardent wish of

Your MAJESTY'S

Most dutiful and devoted

Subject and Servant,

*Edward Edwards.*

## P R E F A C E,

---

ALTHOUGH various treatises on the science of Perspective have been written, some of which have great excellence, yet it may with truth be asserted, that not one of them is calculated to be useful, or even intelligible, to such artists as are not acquainted with Geometry, yet wish to gain a knowledge of the science, sufficient to qualify them to conduct their works upon true principles. The defects which destroy the utility of those treatises will be clearly demonstrated, by arranging them in two classes, and then considering each under its specific character. In the first class are those which, by their examples, appear clear and instructive at the first view, but when examined are found deficient in science and theory, and are even wanting in the explanation of the few principles which they contain. Such are the defects of the works of *Maralois*, the treatise commonly called *The Jesuit's Perspective*, and of *Pozzo*.

In the second class are those treatises which are the best, and contain the truest principles of the science; but are so mathematical in their structure, and consequently so abstruse to those who are not versed in the Elements of Euclid, that they contain no examples of forms or figures in Perspective, and consequently have nothing that can invite the eye of a practical artist to examine their principles.

Such

Such are the disadvantages attending the elegant work published by Dr. Brook Taylor, of Cambridge, first in the year 1715, and again, with improvements, in 1719. The same inconveniencies attend the treatise by Mr. Hamilton, which, added to its magnitude, deters the artist from its perusal, rather than invites him to study the science it contains.

There is also another work that has infinite merit, written by T. Malton, senior, and published in 1775; which contains some excellent and masterly examples: but he has destroyed their utility by entangling the vanishing points, and crossing the diagram in so confused a manner, that it is almost impossible for a young practitioner to trace and distinguish the different figures.

These faults, which are too frequent in books of instruction, have arisen from two causes; the first is, that the authors of them, though perfect masters of the science on which they wrote, had not acquired the art of explaining it to those who are unacquainted with it; they seem also to have forgotten, that those who would instruct, must descend to that language for explanation, and apply those figures for illustration, which are suitable to the powers and comprehension of their pupil, rather than to the display of their own science and abilities.

The second cause of the defects before mentioned arises from the following circumstance; which is, that excepting *Pozzo* and *Highmore*, there is no author who has written on the subject of Perspective, that can be considered as a painter; consequently they were deficient in the knowledge of the forms of objects, and thereby unable to apply their science to the uses required by the artist.

Having experienced and considered the disadvantages before mentioned, the author presumed to think that a work might be produced, better calculated than any one that has hitherto appeared, for the service of those artists who have neither time nor resolution sufficient to investigate the science of Perspective, under its present obscurities  
and



and difficulties. Whether the following treatise, which he has attempted in conformity to his idea, will answer the end proposed, must be left to the reader to determine.

The arrangement of the work is as follows :

As a preliminary apparatus, a selection of definitions and problems in geometry is given, all of which are absolutely necessary to be understood by those who mean to practise Perspective ; they are inserted not to increase the size of the volume, but that the student may not be compelled to seek for other books, before he can make use of this.

After the Geometry follows the Perspective, which is divided into six sections ;

The first is introductory, and contains all the terms that are employed in the practice, together with their definitions, illustrated by proper examples ; the difference between the *center of the picture* and *point of sight* is defined ; and the various positions in which objects may be disposed to the picture : it also contains the rudiments of practice for lines, parallel and perpendicular, to the picture.

The second section contains instructions, with examples for drawing objects, the fronts and sides of which are *parallel* and *perpendicular* to the picture.

The third section treats of objects, the fronts of which are *inclined* to the picture.

In the fourth section are examples, with instructions for delineating objects, when the planes or faces of which they are composed are *inclined* both to the *picture* and to the *horizon*.

It must be observed, that the aforementioned sections contain all the practical principles necessary for the delineation of objects in Perspective, however their different planes may be disposed to the eye of the spectator.

The

The fifth section treats of shadows, in which the author has attempted to explain the leading principles of that part of the science in the clearest manner he was able ; but whatever his success may have been, it must not be expected that this part can be clear and easy to those who do not well understand the preceding sections of the work ; therefore the student must make himself master of those, before he attempts shadows.

The sixth and last section contains methods for facilitating operations in difficult cases, as also some theoretic instructions, together with observations by way of praxis ; all of which will be found extremely useful to the student.

In the technical language of the science, the terms adopted by Dr. Brook Taylor are united with those employed by the old writers on Perspective, by which means it is expected that the study of the science will be facilitated to those who chuse to refer to the works of that great master and his principal successors.

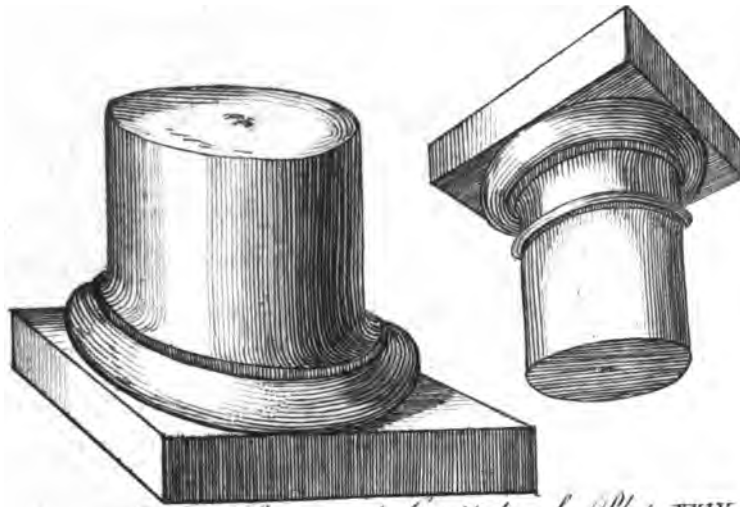
The plates contain a selection of useful and familiar examples, such as are most generally wanted in the common course of practice, yet such as will include all the positions in which objects may be placed to the picture or spectator ; omitting the inclined picture, for which the student is referred to the senior Malton, Hamilton, &c.

Most of the examples are drawn to a scale, the use of which is explained in the first section, and applied in most of the following. This circumstance has never before been attended to by writers on the subject ; and therefore it may be hoped, that this will operate as an improvement, and greatly facilitate the study of the science in its practical part : but the reader must observe, that the author does not mean to offer any new method of process, founded on any superior theory of the science ; he only wishes to teach the readiest mode of practice, directed by the principles of Dr. Brook Taylor, whose  
writings

writings on Perspective are certainly the *ne plus ultra* of the science, and do infinite honour to his country.

At the end of the sixth section is added a Discourse on the conduct and composition of a picture; which, if attended to, will not only help to explain the principles of Perspective, but also prevent much error in the future works of those artists who have not opportunity to enter deeply into the science.

The author cannot conclude this preface without observing, that in the course of the work he certainly would have endeavoured to give more copious instructions concerning the theory of the science, were he not of opinion, that this cannot be done with sufficient effect without personal explanation, and that with an apparatus adapted to the purpose, which is absolutely necessary to those who are not acquainted with Geometry; but to such as have received a mathematical education, and comprehend the eleventh book of Euclid, Dr. Brook Taylor's treatises are sufficient for the theory, and such persons will require but little assistance in the practice. If, after studying him as the great theorist of the science, they find any help in the practical part from this work, the author will rejoice in having facilitated the study of a science which is useful to the scholar, ornamental to the gentleman, and indispensably necessary to the artist.



*Muscan Base and Capital, See Plate XXIV.*

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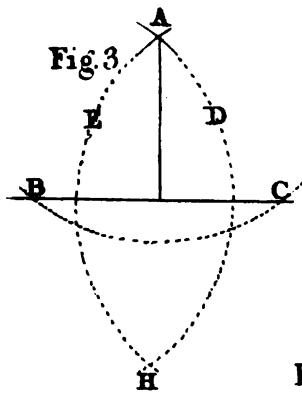


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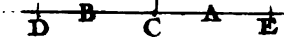


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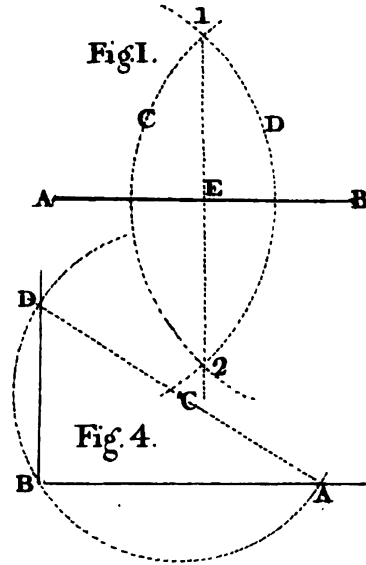


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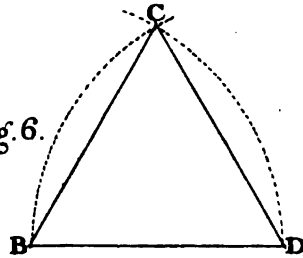


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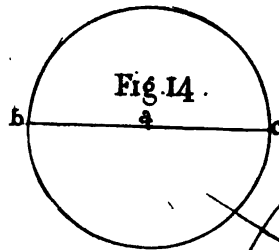
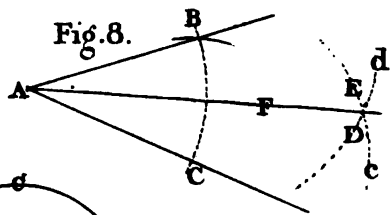


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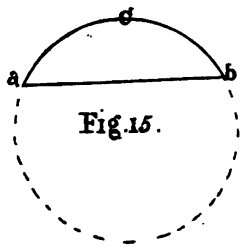


Fig. 15.

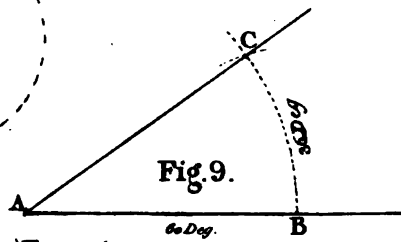


Fig. 9.

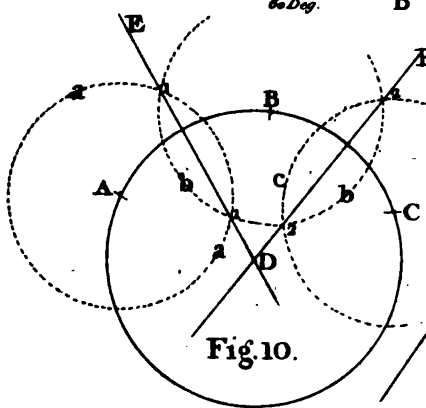


Fig. 10.

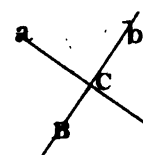


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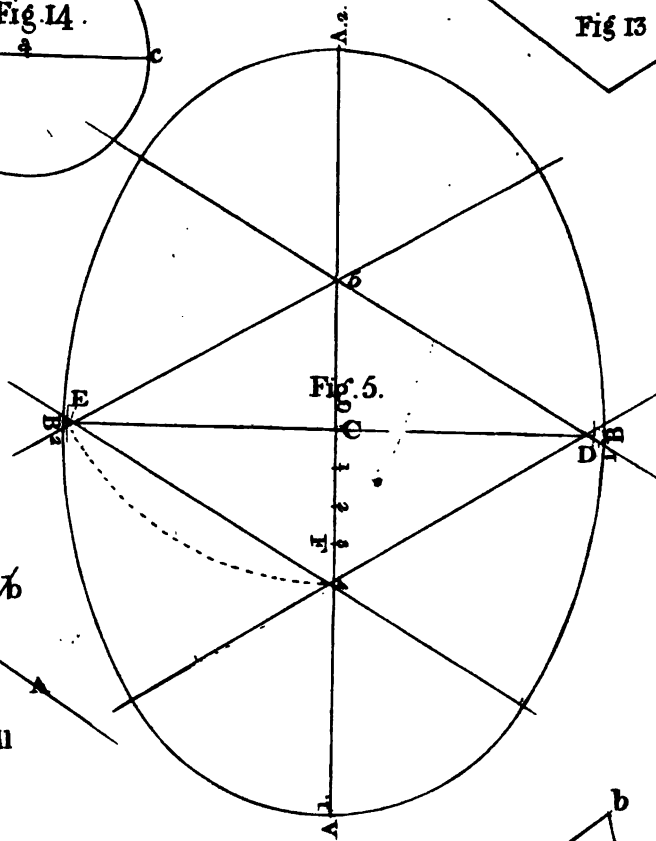


Fig. 5.

Fig. 13.

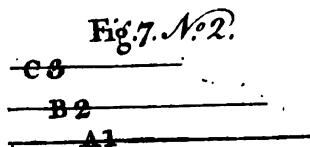


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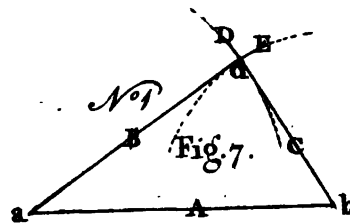


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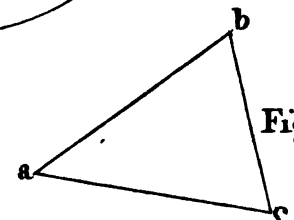


Fig. 12.





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# GEOMETRY.

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## *DEFINITIONS and PROPOSITIONS.*

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**A** STRAIGHT LINE, or right line, is that which lies evenly between its extreme points. It is evidently the shortest distance between them.

A plane, or plain surface, is that which lies evenly between its extreme boundaries, which may be one or more curved lines, or any number of right lines, not less than three.

It has evidently this property, that any two points being taken in it, the straight line between them lies wholly in that surface.

If two or more straight lines on the same plane are so situated, that they would if continued never meet, they are parallel to each other.

If they are so placed that they would cut each other, if continued, they are then said to incline to each other, and they form, at the point of intersection, what is called the angle of their inclination. The point of intersection may be supposed in either of the lines, for it is common to both.

If two lines, when cutting each other, form equal angles on every side of them, such angles are called right angles, and the lines are said to be at right angles, or perpendicular to each other.

B

*Examples*

*Examples of Lines.*PLATE  
I.

Fig. 7, N° 2. The lines A 1, B 2, C 3, are parallel to each other, for if they were continued, or produced, they would never meet.

Fig. 8 and 9. The lines A B, and A C, are inclined to each other: the point A is their intersection.

Fig. 11. The lines A a, B b, cross or intersect each other at right angles, therefore B b is perpendicular to A a, or A a is perpendicular to B b.

The point of intersection C may be supposed in the line A a, or in B b, for it is common to both.

Of ANGLES, that which is less than a right angle is called an acute angle; that which is greater than a right angle is called an obtuse angle.

A plane figure bounded by three straight lines is called a rectilineal triangle.

An equilateral triangle, is that which has all its sides equal: it has also all its angles equal. Fig. 6.

An isosceles triangle has only two of its sides equal to each other: the angles opposite to these equal sides are also equal. Fig. 12.

A scalene triangle has all its sides unequal. Fig. 7, N° 1.

The angles of a scalene triangle are all unequal; of any two angles that one being the greater, which is opposite to the greater side.

The converse of the three last propositions is also true; viz.

If a triangle has its three angles equal, its sides are also equal.

If a triangle has two angles equal, the sides opposite to them are also equal.

If a triangle has three unequal angles, its sides are also unequal; of any two sides, that one being the greater, which is opposite to the greater angle.

*Examples of Angles.*

The angle A B D, Fig. 4. is a right angle, as are also the angles of Fig. 11. PLATE  
I.

Fig. 8, is an acute angle, and the angles of the triangles, Fig. 7 and 12, are all acute.

Fig. 13, is an obtuse angle.

Having described the properties of right lines and angles, it will be necessary to speak of the circle.

A CIRCLE is a plain figure contained by one line, which is called the circumference, and is such, that all straight lines drawn from a certain point within the figure to the circumference, are equal to one another.

The point from which such lines are drawn, is called the center of the circle.

A diameter of a circle, is a straight line drawn through the center, and terminated both ways by the circumference.

A radius is any right line, drawn from the center of the circle to the circumference, and is equal to half the diameter.

A semicircle is the figure contained by a diameter, and the part of the circumference cut off by the diameter.

A segment of a circle is the figure contained by a straight line, and any portion of the circumference it cuts off.

A chord of an arc is a right line, joining the extremes of that arc.

The longest chord that can be drawn in a circle is the diameter, which always passes through the center: and any portion of a circle cut off by a right line, may be considered as a segment, whether greater or less than a semicircle.

*Examples.*

PLATE I. Fig. 14, is a circle; the point, a, is its center, and the line b c is the diameter, the half of which is the radius, as from a to b, or from a to c.

The semicircle is that portion of the circumference which lies between the points c and b either above or below the line b.c.

Fig. 15, is the segment of a circle, the portion of the circumference lying between a and b, marked c, being the arc, and the line a b, the chord of that segment or arc.

In Fig. 15, that part of the circle expressed by the dotted line, is the greater segment; the part marked a, b, c, the less segment.

*Of Planes.*

In the study of perspective, it is required to have a clear and accurate knowledge of Planes.

In the theory of the science, imaginary planes are of the utmost consequence; and in practice, the consideration of real planes is absolutely necessary, because the forms of most objects produced by art are composed of planes.

Planes may be situated in the same relation to each other as lines.

If they are so placed that if continued they would never meet, they are then parallel to each other:

But if they are so disposed that they would cross each other, they are then said to incline to each other; and the line in which they meet or cross each other, is called their intersection.

The intersection of two or more planes is a right line, and that line may be supposed in either of those planes.

If two planes cross or cut each other, so that they have equal spaces between them, they are then at right angles, or perpendicular to each other.

*Example*

## GEOMETRY.

### *Example of Planes.*

The faces, or sides of the block B, Fig. 2, Plate III. are planes; as also the faces or sides X 1, X 2, of the building R 2; and those planes are at right angles, or perpendicular to each other.

PLATE  
III.

### PROBLEMS.

#### PRO. I.

Fig. 1. To bisect a right line. See Euclid, Problem 10, Book I. PLATE I.

Upon either of the points A or B, in the right line A B, fix the compasses, and with any distention, draw an arc, as the arc 1 D 2; then with the compasses on the opposite point, as on B, draw another arc, as the arc 1 C 2; through the intersections 1, 2, of the two arcs, draw the right line 1 E 2, and the line A B will be equally divided or bisected in E.

#### PRO. II.

Fig. 2. To erect a perpendicular from a given point in a given right line. Euc. P. 11, B. I.

Let A B be the right line given, and C the point at which the perpendicular is to be erected.

With one foot of the compasses on C, set off two points at equal distances from C, as D and E, upon the line A B.

Then with the compasses distended, on the points D and E, draw the arcs F and G, and from their intersection draw a right line to C, which will be perpendicular to the right line A B.

#### PRO. III.

Fig. 3. To let fall a perpendicular from a given point upon a given right line. Euc. P. 12, B. I.

The given right line is B C, and A is the point from which it is required to draw a right line perpendicular to B C.

With

PLATE  
I.

With the compasses sufficiently distended, and placed upon the point A, draw the arc B C, cutting the given line in the points B and C.

Then with the compasses on the points B and C, describe the arcs A D H and A E H, intersecting each other in the points A and H.

Through the points A H, draw a right line, and it will be the perpendicular required.

## PRO. IV.

Fig. 4. At the extremity of a given right line, to draw a line which shall be perpendicular to the given line.

Let A B be the given right line, to which it is required to draw a line perpendicular at the extremity B.

Take any point, as C, out of the line A B, and with the radius C B, describe the arc A B D.

From the point A draw a right line through the centre C, that may intersect the arc, as at D.

From the point D, draw a line to the point B, which will be the perpendicular required.

## PRO. V.

Fig. 6. To describe an equilateral triangle upon a given right line. Euc. P. 1st, B. 1st.

Let the line B D, be the given line.

Upon the point B fix the compasses, and with a radius equal to B D, draw the arc D C.

Then with the compasses upon the point D, with the same radius, draw the arc B C.

From the intersection C, draw the lines C B and C D, and the triangle will be completed.

PRO.

## GEOMETRY.

7

### PRO. VI.

PLATE  
I

Fig. 7. To construct a triangle, the sides of which shall be equal to three given right lines. Euc. P. 22, B. 1.

Let the given lines be A 1, B 2, C 3, Fig. 7, N° 2, and let the line A 1, be the required base of the triangle.

Draw the right line A, N° 1, equal to the right line A 1, N° 2.

Take the length of the line B 2, in the compasses, and fix one foot of them on that extremity of the line upon which the side equal to B 2 is to be placed, suppose on the point a, and describe the arc D.

Then take the length of the line C 3 in the compasses, and with one foot upon b, the other extremity of the line A, N° 1, describe the arc E.

Then from the intersection of those arcs, draw the lines B and C. and the triangle will be completed.

### PRO. VII.

Fig. 8. To bisect an angle. Euc. P. 9, B. 1.

Let B A C be the given angle.

With the compasses fixed on the point A, describe the arc B C, then on the points B and C, describe the arcs D d and E e of equal radii intersecting each other, as D d, E e.

Through their intersection draw a right line to the vertex A, and the angle B A C will be equally divided or bisected.

### PRO. VIII.

Fig. 10. \* To describe an arc or circle, which shall touch or pass through three given points.

Let the given points be A, B, C, through which it is required to draw an arc or circle.

\* This problem is in effect the same with the 25th of the 3d Book of Euclid, which teaches to complete a circle from a given segment.

Upon

PLATE I. Upon each of the points as a center, describe circles of equal magnitude, and sufficient radii to intersect each other, as the circles a a, b b, c c.

Then through the intersections 1 1, 2 2, of those circles, draw the right lines D E and D F, which will intersect each other in the point D.

Then will D be the center of a circle or arc that will touch, or pass through the given points A B C.—Therefore with the compasses upon the point D extend them to either of the points A, B, or C, and describe the circle required.

As no one must hope to become master of the practice of perspective who does not understand the construction of angles, it will be proper to explain the process.

Every circle is, by universal consent, divided into 360 equal parts, called degrees\*, each of which is again divided into 60 equal parts called minutes, and those again into 60 equal parts called seconds, by which degrees, minutes, and seconds, every angle is measured. When two right lines cross each other, they constitute an angle; to measure which, a circle must be drawn from the point where the lines intersect each other, as from a center, cutting the right lines, and the portion of the circle, which lies between those right lines, determines the measure of the angle which the lines make with each other.

*Example.*

Fig. 9. The two lines A C and A B cut each other and form an angle; the measure of which is that portion of the circle marked B C, lying between the lines A C and A B.

\* The measures of angles are expressed by the following characters.

Degrees are marked by the letter °.

Minutes by a single stroke '.

Seconds by double strokes ''.

Thus the following characters 36° 10' 6'' must be read thirty-six degrees 10 minutes and six seconds.

The



The same process determines the inclination of planes.

PLATE  
I.

It is necessary to observe, that the student must not conceive a difference from the size of circles, for whether they are great or small, the proportionate section continues the same.

When lines are to be drawn inclined to each other in a given angle, the following methods are the readiest and most useful.

In every case of instruments, necessary for those who study Perspective, there is an ivory or box ruler, upon which is marked a scale, which is formed of double right lines parallel to each other, and distinguished by the letters C H O, or C, for chords; it is also figured with a number of degrees to the amount of 90.

The use of this scale is as follows:

Suppose it be required to draw an angle of 36 degrees. Fig. 9, Plate I.

Fix one foot of the compasses on the extremity of those lines upon the scale, which are distinguished by the letters C H O, or C, and extend the other to the point marked 60, which is the radius of the circle.

Then having drawn one line for the base of the angle, as the line A B, fix the compasses on the point A, and draw the arc B C.

Then apply the compasses again to the same scale, one foot on the point C, as before, and extend the other to the figures 36, the number of degrees required.

The compasses thus extended, apply one foot to the point B, in the line A B, and mark off the measure at the point C in the arc B C.

Then from the point A draw a right line through C, as the line A C, and the required angle will be completed, A C being inclined to A B, or A B being inclined to A C, in an angle of 36 degrees.

As it sometimes happens that there are more than one line of chords upon the ruler, it is necessary to take particular care that the measures are all taken from one line.

C

There

PLATE  
I.

There is also another instrument called a protractor, which is sometimes made of ivory, sometimes of brass; if of the former, it is a parallelogram; if of the latter, a semicircle. In the semicircular instrument, the base or straight line has a point in the center, and the circular part is marked with a number of degrees upon the edge. It is the same with the parallelogram, one side being the base, and the other three sides being marked with the degrees. The use of the forementioned instruments may be described as follows:

Let it be supposed that a right line is already drawn, as the line A B, Fig. 9, and it is required to draw another right line at the point A, that shall make a given angle with the line A B, suppose of 65 degrees.

Apply the base or lower edge of the instrument to the given line A B, so that the point or center may coincide exactly with the point A in the given line, at which the angle is to be constructed; then at the point which is numbered 65 on the edge of the instrument, mark a point as C; then from the point A draw a line through C, and the required angle will be completed.

To one who is unacquainted with the principles and practice of Geometry, the following remarks will not be useless:

FIRST. When geometrical writers refer to triangles which are marked with three initial letters, the *middle letter* always denotes the particular angle of the triangle to which the reference is made. Thus in referring to the triangle Fig. 12, Plate I, if it be said that the angle b a c, is the given angle, the point or apex a of the triangle is meant; but if the letters were arranged a c b, then the point or apex c is the angle indicated.

If any other letters are employed, the same rule must be observed in the application. PLATE  
I.

**SECONDLY.** When a line is said to be perpendicular, it must be understood to be so disposed in relation to some other line, without regard to the position of the plane upon which it is drawn, or its seeming situation to the natural horizon ; for a line may be perpendicular to another line, yet neither of them be vertical, or, as vulgarly called, upright.

Thus in Fig. 11, Plate I, the line A a is perpendicular to the line B b, or the line B b is perpendicular to the line A a ; yet neither of those lines represent vertical lines, or lines perpendicular to the horizon, because they are disposed obliquely to the sides of the plate upon which they are drawn.

The preceding remarks are offered as a caution to those who wish to study the writings of Brook Taylor, Hamilton, and other authors, who often mention perpendiculars, which, by their situation on the print, appear to the unscientific eye as inclined ; thereby confounding those who are unacquainted with this necessary distinction.

**PLANES** have already been defined ; but lest they should not be perfectly understood, some further attempts shall be made towards their illustration.

Suppose any square room with a floor and flat ceiling, with four flat sides ; all these together constitute six planes, perpendicular or parallel to each other.

Where any one of the sides meets the floor, that meeting is the intersection of those two planes ; and the line produced by such intersection, may be considered as in either of those planes, in the floor, or in the side.

PLATE  
I.

If a right line be drawn upon the floor, exactly even to one of the sides, that line will be parallel to two of the sides, but it will be perpendicular to the other two sides; it will also be parallel to the ceiling, because it is in the plane of the floor which is parallel to the ceiling.

If upon any side of the room a right line be drawn either perpendicular or inclined to the floor, and another right line be drawn on the floor from the point where the first line touches the floor; both these lines may be considered as being in one plane, which passes through the wall and the floor,—but this may be considered as an imaginary plane.

The author has been the more particular on this subject, because it is necessary that those who wish to practise Perspective should perfectly understand the nature of planes, as they relate to the forms of objects; and those who desire to study the theory of the science must not only consider the real, but also the imaginary planes;—therefore the foregoing remarks are given, which will be found useful, especially to those who have not before considered the subject.

This geometrical section shall be closed with the best method of constructing an oval or ellipsis to any given size by the compasses; an operation which is but little known, but which is certainly very useful.

It is required to form an oval whose transverse diameter is equal to the line A 1, A 2, and whose conjugate is equal to the line B 1, B 2, Fig. 5, Plate I. \*

Draw two lines at right angles or perpendicular to each other, as the lines A 1, A 2, and B 1, B 2, and their intersection C is the center.

\* By the transverse is meant the longest diameter, and by the conjugate the shortest diameter; as the line A 1, A 2, is the transverse, and the line B 1, B 2, the conjugate diameter, Plate I, Fig. 5.

From

From C the center, set off half the given or required measures of the transverse and conjugate diameters, as C A 1, C A 2, and C B 1, C B 2. PLATE  
I.

Take the space from the center C to B 1, or from C to B 2, which is half the breadth of the oval, and set it on upon the transverse diameter, from A 1 to F, then divide the space between C and F into three equal parts, and set one of these parts from 3 to 4.

Take the space from C to 4, and set it on upon the line C A 2 to 5, making C 5 equal to C 4.

Then, upon the space between 4 and 5 as the base, construct an equilateral triangle, as the angle 4 D 5; and on the contrary side construct the similar triangle 4 E 5.

Draw right lines through the points D, 5, and also through the points D, 4. Repeat the same through the points E, 4, and also E, 5.

Then will the points 4 and 5 be the centers for what may be called the ends of the oval, and D and E the centers for what may be considered as the sides of the oval; therefore upon those points with the compasses describe the oval required, observing that the lines D 5, D 4, and E 4, and E 5, determine the different segments required.

It must be observed, that the above process does not produce a true oval, but forms an excellent substitute, especially as no means have yet been discovered by which a perfect ellipsis can be produced, except by the trammel, or by the pins and string, both of which are inconvenient on canvas or paper; while the foregoing method is sufficiently correct for any general purpose, and therefore will be found very useful to every artist.

The

PLATE     The geometrical problems given in this section are so essential to  
L     the artist, that every student in painting, sculpture, and architecture,  
ought to impress them on his memory, so as to execute them with  
facility upon every occasion, in which they may be required.

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# P E R S P E C T I V E.

---

*The First or Introductory Section, containing Terms, Definitions,  
and Rudiments of Practice.*

**D**R. BROOK TAYLOR commences his treatise on perspective in SECT.  
I.  
the following words :

“ Perspective is the art of drawing on a plane the appearances\* of  
“ any figures, by the rules of geometry.

“ In order to understand the principles of this art, we must con-  
“ sider that a picture painted in its utmost perfection ought so to  
“ affect the eye of the beholder, that he should not be able to judge  
“ whether what he sees be only a few colours laid artificially, or  
“ the very objects there represented.”

This may be considered as a general definition of perspective, and  
probably as clear as words will admit. Yet to those who have not  
considered the subject, some farther explanation and illustration may  
be necessary.

\* For the word *appearances* the doctor has suffered from the rod of the critics, who  
insist that he should have employed the word *representations*; but the distinction is  
perhaps too trivial to deserve censure; yet it is certain that the words have very  
different meanings, the former implying the effect or image any object produces on  
the eye, but the latter the description of that effect or image drawn upon some plain  
tablet, or other surface: but since the appearances are to be described, it may be  
considered as a metonymy, by which the effect is substituted for the cause.

The

SECT.  
I

The spectator who views an object receives the impression of its form upon the retina of the eye, by means of rays of light reflected from the object and coming from all points of it, in right lines to the center of the eye, forming what is called the cone of visual rays.

If this cone of visual rays be intersected by a transparent or opaque plane, that intersection, provided it can be delineated, will be the perspective representation of the appearance of the object viewed by the spectator.

This will be better understood, if it be supposed that any person stands looking through the glass of a window at some distant object or building; let him fix himself at a particular spot, and with his eye perfectly steady, trace out upon the glass the form of the object or building as it appears to him, and he will find that the figure so produced will be a true perspective representation of that object or building, which, if skilfully shadowed and coloured, would not be distinguished from the original object viewed at the same point or station.

This experiment furnishes the great outline of the theory of Perspective, and the practice is founded upon it; for if the measures of the original object, which was viewed through the glass, can be obtained, together with the distance between the spectator and the window, as also the space between the window and the object, those measures being applied by a proportionate scale to certain lines drawn agreeably to the rules of the science, upon a plane, or flat tablet, a representation will be produced similar to the tracing upon the glass. And such representation will be so perfect, that all the lines will exactly coincide with the original object, provided it be placed at the proportionate height and distance; it will also correspond with the tracing upon the glass.

From the consideration of the practical part of the foregoing experiment, it will be evident to every student in the science, that the  
perspective



perspective representation of objects can never be truly delineated without the knowledge of their forms, their proportions, or the measurements of their parts. He must also consider how the objects are disposed to his view, whether their sides or faces be parallel or inclined to the picture, or whether they be inclined both to the horizon and picture; from all which circumstances it must follow, that no person will ever make great progress in Perspective, who is unacquainted with Geometry and Architecture; for Geometry may be considered as the foundation of the science, while architectural designs furnish the best and grandest subjects for the application of its principles, and the display of its deceptive powers.

It may perhaps be objected, that the art of painting requires so much time and application, that the student can have but little leisure for the study of Geometry or other sciences; but this objection can only be made by the weak and indolent, and can have no weight with him who forms a right judgment of the art; an art which is justly esteemed not only for the elegance and sublimity of its productions, but also for the extensive knowledge which it requires the artist to possess, before he can excel in the superior exertions of the pencil.

As it is the purpose of this introductory section to prepare the reader for the following work, it will be proper here to beg his attention to the following circumstances.

First, The Author has thought it necessary to distinguish the horizontal line, \* above any other vanishing line, contrary to the observation of Dr. Taylor, who, in his preface to the second edition of his Principles, observes that he makes "no difference between the plane of the horizon and any other plane whatsoever;" a circumstance

\* Vide similar remarks in "The Elements of Linear Perspective, by Edward Noble," printed for T. Davies, 1771, page 46.

SECT. I. which very much obscured his principles, particularly to those who, with no skill in geometry, have endeavoured to improve their practice by his instructions.

For, although the reasons he gives for his conduct are perfectly just, namely, that "all planes, as planes, are alike in geometry;" yet the painter or designer in Perspective is obliged to have recourse to this line, before he can possibly determine any other vanishing line in the picture. But of this more will be said under its proper head.

Secondly, It is necessary to observe, that the line which in this work is called the parallel of the *picture*, is the same with what is called by Hamilton and Malton the parallel of the *eye*, the author thought it convenient to change this term, because there are many other lines in the process which may be considered as parallels of the eye, while there is but one that can claim this particular distinction.

Thirdly, All the examples and figures in the following work are drawn by the shortest process, without having their geometrical plans drawn at the bottom of the picture, or below the base line, at their full proportions, as was the practice with the old writers upon the subject, and which has been absurdly imitated by too many of the moderns, who have pretended to illustrate the doctor's theory, the superiority of whose principles renders that tedious process unnecessary; consequently they are better adapted to the painter's use; for as he must ever find the lower edge of his canvass the extreme limits for operation, he can have no room below that boundary, to draw plans in their geometrical proportions and situations.

In the preface, it has been observed, that deep theory is not attempted in the following work; it is the practical part only upon which the following instructions are employed: yet, as some theoretical remarks must of necessity be made, they are chiefly disposed in

notes, and the student will do well to consider them maturely, and by their assistance to form his observations and reflections upon the appearances of objects. Above all things, he must make himself master of the distinction between the center of the picture and the point of sight; also of the *distance of the picture*, and the *distance of a vanishing point*; for if those principles are not well understood, no great progress can ever be made in the science.

Lastly, the student is advised to copy the examples either by a larger or smaller scale, but never to the same size with the given Examples; or, he may select different figures of his own choice; but above all things let him work constantly to a scale, keeping the height of the eye in due proportion to nature, and to the construction of the object he means to delineate.

This introduction shall be concluded with observing, that the following Treatise is founded upon the theory of Dr. Brook Taylor, who first taught the real principles of Perspective, or, in other words, was the first person who demonstrated the true methods of finding the vanishing points, and vanishing lines, for delineating the representations of lines and planes perspectively, in whatever positions the originals may be disposed to the picture; Before him, the vanishing points for oblique lines were called accidental points, and they deserved no better appellation, for they were produced by chance, without rule: hence it followed, that examples of objects, the sides of which incline to the picture, were scarcely ever given by the old writers on Perspective; and the few that may be found in their works are constructed by a process so inverted, that the vanishing points are determined by the representation of the object\*, instead of the representation being produced by the vanishing points.

\* See the Examples in the Jesuit's Perspective, pages 102—111, both of which are very imperfect, particularly the example in the upper part of page 111, which is totally false.

## SECT.

## I.

It must also be observed, that when the lines or planes to be represented were inclined both to the horizon and picture, the old writers appear to be wholly ignorant of the necessity, or even use, of oblique vanishing points; and, therefore, constructed their examples by means of the center and distance of the picture only, first finding the representations of certain points in the object, then joining those points in the best manner they could to produce the required figure; and this method served them for all representations of objects *inclined* to the picture or horizon. But this process, which is extremely defective and fallacious, is at the same time so laborious and tedious, that the simplest forms require more time and trouble to complete their representations, than would serve to produce a very complex figure, when conducted by Doctor Taylor's principles, which are so extensive, that they apply to the *inclined* picture equally with the *vertical*, or what may be called natural picture; which consideration leads the author to observe, that in the following work there are no instructions given concerning the *inclined* picture, because he does not think that such can ever be of real use to the artist; and therefore recommends the works of the elder Malton and Hamilton to those who wish to pursue the study of Perspective beyond the instructions which are given in the following pages.

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# P E R S P E C T I V E.

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## *TERMS and DEFINITIONS.*

**A**S no Science can be explained without the use of technical language, the Student in Perspective must clearly understand the following Terms and Definitions : SECT.  
I

### *TERMS.*

1. The Picture.
2. The vanishing Points.
3. The vanishing lines.

The vanishing points are as follow :

1. The center of the picture, commonly called the point of sight.
2. The distance of the picture.
3. The oblique vanishing points.

The vanishing lines are the following :

1. The horizontal line.
2. The prime vertical line.
3. The oblique vanishing lines.

To

SECT. I. To these points and lines may be added, the station point, and the base or ground line, by Dr. B. Taylor called the intersection of the picture.

### DEFINITIONS.

\* In the practice of Perspective, the term Picture means the paper, canvass, or tablet, on which the representation of any object is to be drawn.

#### *The vanishing Points.*

A vanishing point is any point on the picture, in which the representations of any number of right lines, the originals of which are parallel to each other, appear to meet or concentrate.

1. The center of the Picture is the first and principal vanishing point, and when the picture is vertical, or, as commonly called, upright, the horizontal line constantly passes through it. The old writers on perspective call it the point of sight.

2. The distance of the picture, or point of distance, is a point which is generally set off upon the horizontal line, either way from the center of the picture or point of sight, in the same proportionate measure that the painter or spectator is supposed to stand distant from the picture, or from the view, or object he means to represent. The old writers call it the *point of distance*; but Dr. Brook Taylor, the *distance of the picture*.

\* In theory, the picture is a section of the optic cone of visual rays, made by a plane passing through that cone, perpendicular to its axis, and at any distance from its apex. In nature, it is all that quantity of objects which is comprehended in the cone of visual rays, at any *one* point of view. Some authors call the Picture the Perspective Table, others the Perspective Plane. See Ditton, Gravesande, Priestley, &c.

3. The

3. The oblique vanishing points, are those points to which all lines tend, which are to represent the appearances of original lines, situated obliquely, or inclined to the picture; and they may be situated on any part of the picture.

SECT.  
I.

These points, by the old writers on the subject, were called accidental points; but they knew no rules, and consequently gave none, for finding them.

#### Example of vanishing Points.

Plate III. Fig. 1. C is a vanishing point, and the lines 1, 2, 3, of the pavement F, which are the representations of original lines perpendicular to the picture, concentrate or vanish in the point C; which point is also the center of the picture.

PLATE  
III.

In Fig 2, of the same plate, the points V 1 and V 2, are oblique vanishing points, and all the horizontal lines in the fronts X 1, X 2, of the building R 2, vanish or meet in those points.

#### *The vanishing Lines.*

A vanishing line is any line on the plane of the picture, in which the representations of original planes, parallel to each other, appear to meet or concentrate.

1. The first and principal vanishing line, is the horizontal line, which, as before observed, when the picture is vertical, always passes through the center of the picture.

2. The next vanishing line is the prime vertical line, which, like the former, always passes through the center of the picture, and is perpendicular to the horizontal line.

3. The oblique vanishing lines, like the oblique vanishing points, depend on the center and distance of the picture, and may be situated in any direction upon the plane of the picture. Of these lines,

SECT. I. as of the prime vertical line, the old writers had no ideas; they never used them, nor ever speak of them in their works.

The base or ground line, which is called by Dr. Brook Taylor the intersection of the picture, is that line which limits the bottom of the picture, and generally indicates the first appearance of the ground or plane, upon which the original objects are placed.

Example of vanishing Lines:

PLATE III. Plate III. Fig. 1. H is a vanishing line, and the floor F vanishes into it; as does the ceiling X, of the building A B. It is also the horizontal line.

In Fig 2. Plate III. the line R is the vanishing line of the plane or face X 2, of the building. This is an oblique vanishing line, the side X 2, being oblique, or inclined to the picture; it is also the vanishing line for the side B of the block; for the sides or faces of the block, and of the building, are parallel to each other, consequently have the\* same vanishing line.

C D 3, in the same figure, is the prime vertical line, and passes through the center of the picture.

*Of the Center and Distance of the Picture.*

As it is absolutely necessary to possess a clear and perfect idea of the center of the picture, as also of the distance of the picture, some farther explanation is here attempted, which the student must consider with attention.

Dr. Brook Taylor, was the first person who distinguished the center of the picture from the point of sight; the latter term being constantly employed by the old writers upon the subject, to express what

\* The representations of all right lines vanish in points. The representations of all planes vanish in lines.



he justly calls the center of the picture, which is a point distinct from the point of sight.

SECT.  
I.  
Plate I.

In the two treatises upon Perspective, published by him, he gives the two following Definitions:

1. "The center of the picture is that point, where a line from the spectator's eye cuts it, (or its plane continued beyond the frame, if need be) at right angles.

"Definition 1st, in 1st Edit. 1715."

2. "If from the point of sight there be drawn a line perpendicular to the picture, the point where that line cuts the picture is called the center of the picture; and the distance between that center and the point of sight, is called the distance of the picture.

"Definition 7th, in second Edit. 1719."

In practice, the center of the picture is that point which is marked upon the paper, canvass, or tablet, to indicate the point which is nearest the eye of the spectator who looks at it; hence follows the Doctor's second Definition, that, if from the point of sight, or (which is the same thing) the eye of the spectator, a right-line be supposed drawn perpendicular to the picture, the point where that right line cuts the picture, will be its center. But the student must remember, that, by the center of the picture is not meant the center of the canvass, or tablet, as it can scarcely ever happen that they will coincide; for, in general, the canvass, or tablet, will not comprehend an equal, but a partial portion, of the base of the cone of visual rays: therefore the center of the picture will be nearer to one side than the other of the tablet, or more toward the bottom than the top, just as the nature of the view, or disposition of the objects to be represented, may require.

The distance of the picture represents the distance at which the spectator is supposed to stand, from the object or landscape he means

E

to

SECT. to represent ; and the choice of a proper distance is of great consequence to the beauty of the representation.

I.  
Plate I.

It is almost needless to observe, that no object can be seen to advantage, unless the eye of the spectator be withdrawn to such distance as shall admit the angle of visual rays to comprehend the whole of the object ; therefore, let it be supposed, the angle of vision is equal to  $45^{\circ}$ , it will be necessary to retire so far from the object, suppose a house, that the space between it and the eye, may be at least equal to the height or width of that house.

So also, in viewing a landscape or street, or the interior of a building, the student may observe, that he will not see any object, nor any of the ground that is close to him ; but on the contrary, his rays of vision will meet the ground or floor, at a point or line considerably distant from the point on which he stands. It is this space, lying between the station or point where he stands, and the part of the plane or floor first seen, that constitutes the distance of the picture.

By considering the foregoing observations, it will be easily understood, that the center of the picture, and point of sight, are two distinct points ; the former being a point on the picture, the latter a point out of the picture. Both points being the extremes of a line, passing from the eye of the spectator to the picture, and perpendicular to it, the length of which line is the distance of the picture.

*Example, Plate II.*

PLATE Let Fig. 1. be considered as representing the interior of a room, II. one of whose sides, as A A A, is open to the country ; and let the figures representing the woman and boy be supposed two persons, viewing the landscape through that aperture.

The

Fig.1.

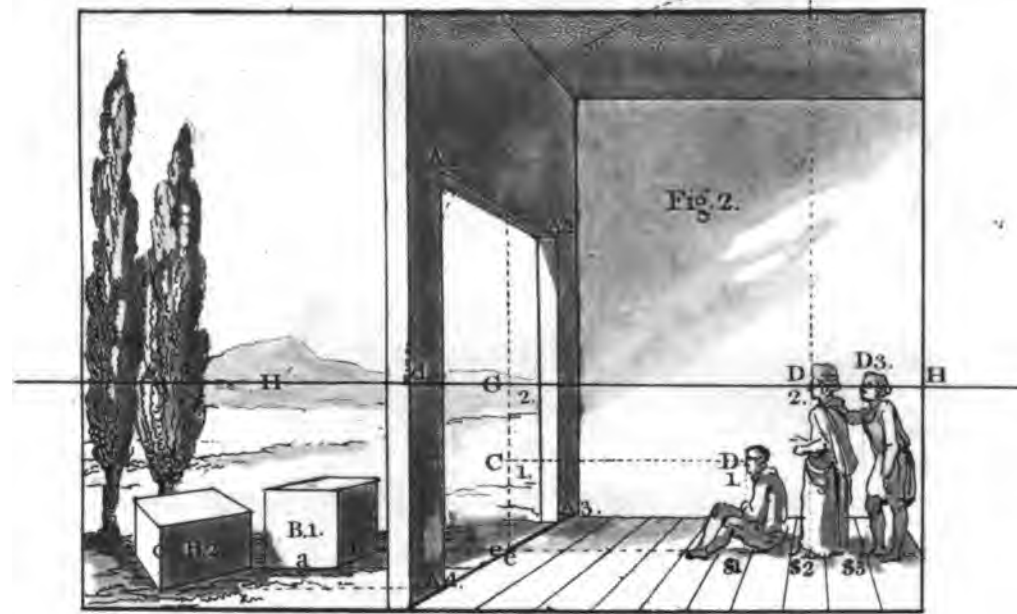
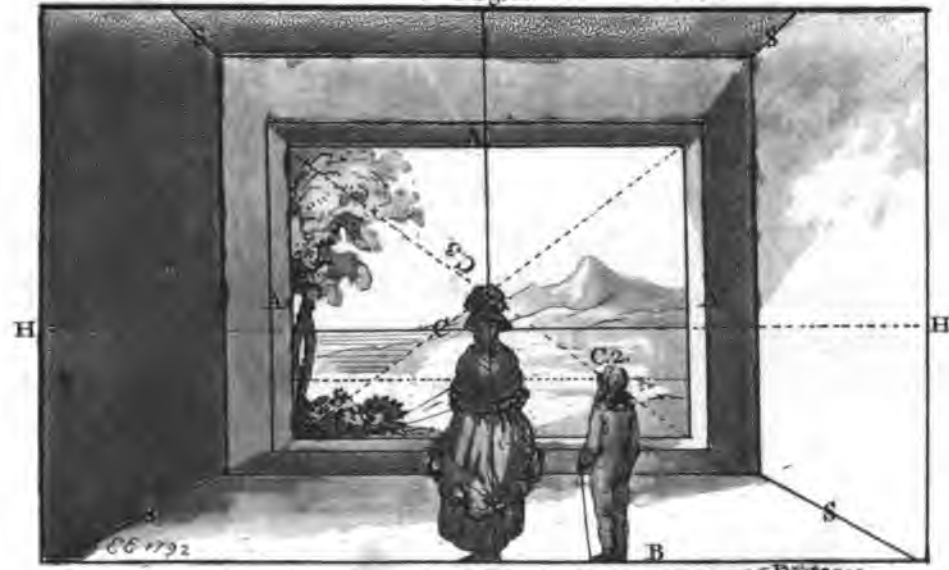


Fig.3.

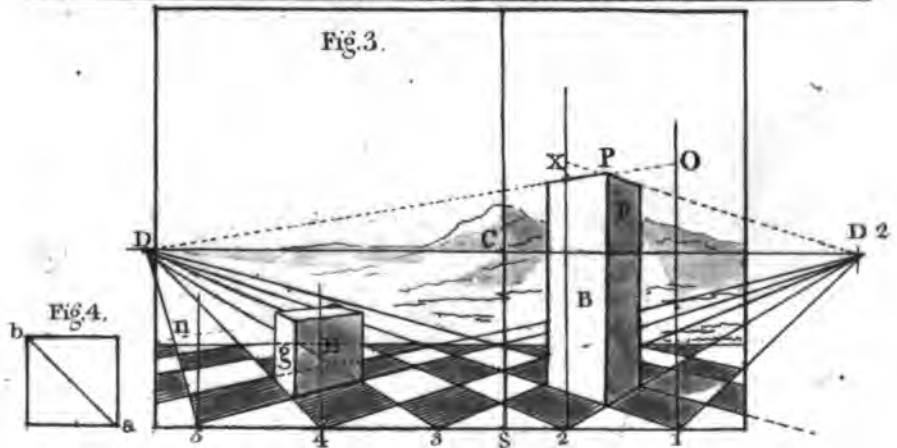
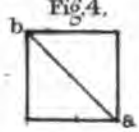


Fig.4.





The aperture must then be considered as the picture, both to the woman and boy. Now the center of this *opening* is at C 3; but this is not the center of the picture, to either of those persons who are supposed to be looking at the view. For, to the woman, it is at \*C, and that point must be considered as the representation of a point in a line, drawn from her eye perpendicular to the plane of the aperture, and intersecting that plane in that point; but to the boy, who is looking through the same aperture, the center of the picture is at C 2, which is very much to the right, and considerably lower down in the picture; for the center of every picture or view is directly opposite to the eye of the spectator, upon that plane which is supposed to intercept the visual rays of the spectator. Hence it will follow, that to persons placed in the situations represented by the figures, that the one placed in the situation of the woman would have a very different view from the other, placed in the situation of the boy.

SECT.  
L.  
Plate II.

To the first figure the horizon is elevated, to the second depressed, because it is shorter than the other. The first figure has the most equal and advantageous view through the aperture; the second less on the right than on the left hand; and part of the view, which can be seen on the right by the woman, is concealed to the boy by the side of the aperture.

In Fig. 2. Plate II. the illustration is farther attempted; and, to the person who views the print, the scheme is in profile, and the center of the picture is at D 2, coinciding with the point of sight of that figure, but in a transverse direction.

\* It is also the center of the picture to the person who views the print, for the whole of Fig. 2. is constructed to that center. It must be observed, that the initials are not exactly upon the points intended; as, C 3 should be at the top of the bonnet of the figure, and C in the middle of the head. C 2, also, should be in the middle of the head of the boy; but they are removed a little to the side, to prevent confusion. H H is the horizontal line to the woman.

**SECT.** Let it be supposed that the figures D 1, D 2, D 3, represent three  
 I.  
 persons looking through the aperture, A 1, 2, 3, 4, which to them  
 must be supposed the picture. The eye of each of those figures is  
 the point of sight to each of them. C 2 is the center of the picture  
 to the persons represented by D 2 and D 3; but to the figure sitting  
 down, whose point of sight is D 1, the center of the picture is at C 1,  
 as much below C 2, as the height of the eye of the figure D 1 is below  
 that of the eye of the figure D 2.

Plate II.

The distance of the picture is also explained by this example,—for the length of the line which passes perpendicularly from the eye of each figure to the picture, constitutes the different distances to each different figure.—Thus the space from C 1 to D 1, is the distance of the picture to the figure D 1; and from C 2 to D 2, represents the distance of the picture to the figure D 2. Here it will not be improper to observe, that at figure D 2 will be the best distance, as it may be presumed that the angle of vision from that figure will coincide with the aperture better than from either of the others; the first being too near, the third too distant.

The station, point, and base line, or intersection of the picture, are also explained by these examples; as the line A 3, A 4, is the intersection of the picture, for it is the bottom of the aperture, and may be considered as the first place at which the figures discover the floor. The station points are the points upon the floor, exactly perpendicular to the eyes of the figures, as S 1, S 2, S 3; or, they may be considered as the points upon which those spectators stand.

Before the student attempts to delineate objects in Perspective, it will be proper for him to consider the forms of objects, and also their positions in relation to the picture.

The

The general forms of plans and elevations, upon which most of the objects of art are constructed, are those of a square and cube, \* the former being composed of lines only, the latter of planes at right angles, or perpendicular to each other.

SECT.  
I.  
Plate II.

Upon these principles are founded the outlines of all buildings, whether plain or decorated; they not only apply to the construction of the edifice, but also to its minutest furniture. Thus, drawing the representations of a simple square and cube, in true Perspective, as viewed in all directions, is to apply all those principles of science with respect to practice, which must be used in the representation of all objects constructed upon the same geometrical principles.

But it is not enough to understand the form and construction of the object; its position in relation to the picture must also be considered, before a true perspective representation can be attempted.—For, let it be required to draw a cube in perspective, as placed upon a horizontal plane, it must be known whether any of its sides are parallel to the picture, or whether any are inclined; for these different positions require very different processes for the obtaining their representations. Therefore, it is to be observed, that there are four different positions in which the sides or faces of a cube may be disposed to the picture. These varieties are occasioned, not only by the form of the object, but also by the position of the plane upon which it is situated; for, in the first and second position, the cube is supposed standing upon a horizontal plane, in the other two, as upon a plane inclined to the horizon.

\* A square is a superficies, formed by four right lines of equal dimensions, cutting each other at right angles.

A cube is a solid, formed by six squares of equal dimensions, at right angles to each other.

**SECT.** The various positions are as follow: \* In the first position, two of the sides of the cube will be parallel to the picture, and the other four will be perpendicular: this position is commonly called parallel to the picture.

**I.**  
**Plate II.**

In the second position, two of the faces or sides will be perpendicular to the picture, and four will be inclined.

The third position will dispose two sides perpendicular to the picture, and four inclined, both to the picture and horizon.

The fourth position will dispose all the faces or sides inclined, both to the picture and horizon.

To explain these important distinctions, let Fig. 2. Plate II. be considered as an example; and let the figures D 1, D 2, D 3, be supposed spectators, looking through the aperture A 1, 2, 3, 4, as before.

Then suppose the blocks, B 1 and B 2, to be the objects which those spectators are viewing, the first parallel, the second inclined to the picture.

The block, B 1, is parallel to the picture, for the face b is parallel to the line A 4, A 3, which line represents the intersection, or base line of the picture.

But the cube, B 2, hath the sides inclined to the picture, for if the planes of those sides were continued, they would all cut or cross the intersection A 4 of the picture.

**PLATE** This is further illustrated by the example in Plate III.; in which  
**III.** Fig 1. represents objects whose sides and faces are parallel and perpendicular to the picture.

\* In theory, the parallelism, or inclination of any line or plane to the picture, implies the disposition of that line or plane to the Axis of the cone of visual rays of the spectator, rather than to the Plane of the picture; so that, to the common vertical picture, the original line that is parallel to the picture, is perpendicular to the axis of the cone of visual rays; and, contrarywise, that which is parallel to the axis of the cone of rays, is perpendicular to the picture.







But in Fig. 2. in the same Plate, all the objects have their sides or faces inclined, or oblique to the picture.

SECT.  
I.  
Plate II.

In Fig. 1, Plate III. the front of the house E, and of the building B, are both parallel to the picture. They are also parallel to each other, while the sides A and G are perpendicular to the picture, as is likewise the ceiling X of the turret.

In Fig. 2. of the same Plate, the sides of the house X 1, X 2, and also the sides of the block B, are inclined to the picture, while the roof R 2 of the house, is inclined both to the picture and to the horizon.

The two figures contained in Plate III. are to be considered as examples of objects disposed to the picture, in the first and second positions of the cube, as before described: but the roof R 2, Fig. 2, is inclined to the horizon, and, therefore, partakes of the third position of the cube, which will be explained in the fourth Section.

It may be observed, that the examples of Plate III. exhibit the representations of objects, disposed in all the positions that are generally required by the artist, upon the natural picture; that is, when the plane of representation is perfectly vertical, and perpendicular to the axis of the cone of visual rays; in which position, the representation of objects that are drawn upon it will appear tolerably just in many different points of view; whereas, in the inclined picture, the representation of objects, when drawn upon it, will appear distorted, offensive, and sometimes unintelligible in all points of view, except that by which it was constructed.

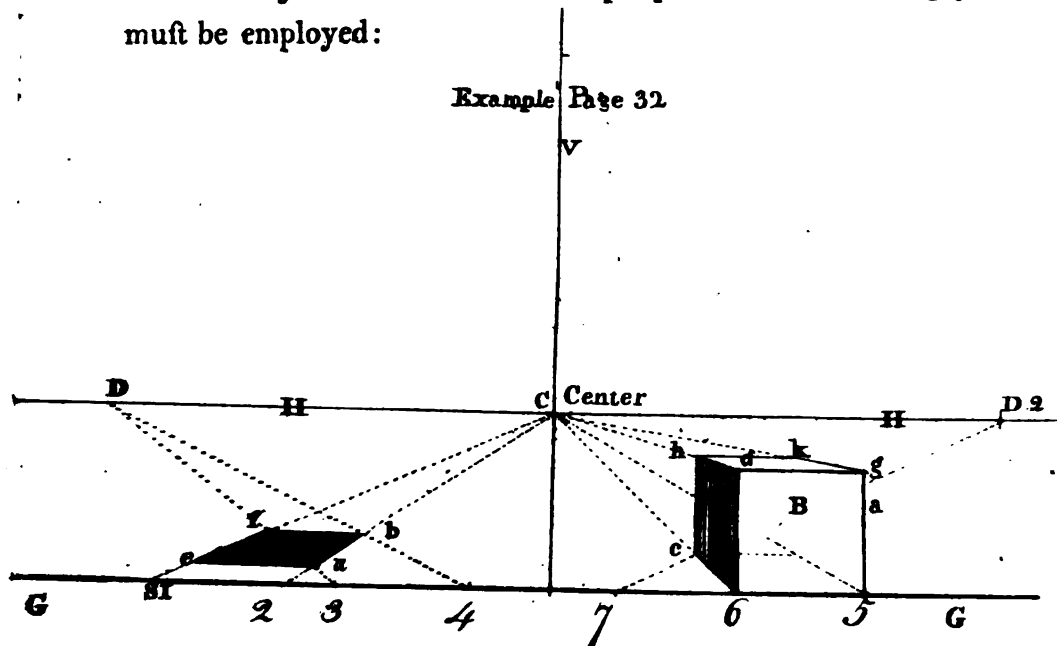
It is from the foregoing circumstances that the author has before observed, in the Introduction, that representations upon inclined pictures are of no use to the painter; and, therefore, no instructions are given in this work concerning that unnecessary part of the science.

*Rudiments*

SECT.  
I.*Rudiments of Practice.*

When objects are to be drawn in perspective, the following process must be employed:

Example Page 32



1. First, draw the base line, or intersection of the picture G G.
2. \* Then, at the proper height, draw the horizontal line H H, parallel to the base line.
3. Upon the horizontal line mark the center of the picture C, commonly called the point of sight. †
4. ‡ Through the center C draw the line V perpendicular to the base line.

\* As the horizontal line always passes through the spectator's eye, it must always be set above the base line, to the same proportionate measure that the eye of the spectator is known, or supposed to be above the ground or plane upon which he stands: the natural height, as commonly allowed, is five feet six inches.

† It is also marked center.

‡ This line is called the prime vertical line. It is no farther necessary, when objects are to be represented parallel to the picture, than as a guide for all the other lines which are required to be drawn perpendicular to the horizon;—but, when the objects to be represented are inclined to the picture, it is indispensable.

5. From

5. From the center of the picture C, set off on either side, or on both sides, upon the horizontal line, the points D, D 2, for the point of distance, or distance of the picture.

SECT.  
I.  
Plate II.

These points and lines are absolutely necessary in all cases, and are sufficient, when the objects to be represented have their sides parallel and perpendicular to the picture; but, if their sides are inclined to the picture, additional lines will be required, which will be demonstrated in the next section.

Having drawn the foregoing lines, let it be supposed, that a square is required to be drawn in perspective, as on the ground, and also a cube, of the same dimensions with the square, standing on the same ground or plane, the square A at some distance beyond the picture, but the cube B close to it.

S 1, is the feat of one of the angles of the square upon the picture, therefore, from S 1, draw a line to the center of the picture C; then take the dimensions of the square with the compasses, (any supposed space will be sufficient in the present case, without a scale), and set that space upon the base line, from S 1 to 2, and draw another line from 2 to C, then take the known distance that the square is beyond the picture, suppose it to be half the measure of one side of the square, and set it on the base line from 2 to 3, and from 3 draw a right line to D, then take the space from S 1 to 2, and set it on the base line from 3 to 4, and from 4 draw another line to D, these last lines will cut the line 2 C\* at the points *a* and *b*; then draw two lines from the points *a* and *b*, parallel to the ground line, till they cut the line S 1, C in the points *e* *f*, and the representation of the square will be completed.

For the block B, proceed as follows: Suppose the point 6, the feat

\* The lines S 1, C, and 2 C, are the indefinite representations of lines perpendicular to the picture, parts of which lines form two sides of the square.

**SECT. I.**  
**Plate II.** of one of the angles of the block ; take the measure of the square A, that is, from S 1 to 2, and set it off from 6 on the base line to 5, and from 5 and 6 draw right lines to C ; then set on the same measure, from 6 to 7, and from 7 draw a right line to D 2 ; and where it cuts the line C 6, as at e, will represent the depth of the base of the cube ; then from the points 6, 5, and e, draw lines parallel to the vertical line V, or (which will produce the same effect) perpendicular to the base line, as a, b, e 1 ; then upon the line a or b, set up from the base line the same measure as from 6 to 5, and at the point draw a line parallel to the base line, cutting the other perpendicular line at g, then will the front face B of the block be formed. To complete the cube, draw lines from d and g to the center of the picture C, and where those lines cut the perpendicular line e h, will give another side of the block.

At the intersection h of the vertical line e h, by the line d C, draw another line, parallel to the base line, joining the line g C at k, and the cube will be completed.

These figures contain the practical elements of all objects that can be drawn in Perspective, when their faces or sides are parallel and perpendicular to the picture ; therefore, the student will do well to consider them attentively, and to make himself master of their construction.

The process, as directed in the five different articles at the commencement of this problem, is indispensably necessary, and must be the same in all cases where the rules of Perspective are employed in the representations of objects, whose faces, or sides, are parallel and perpendicular to the picture ; but when the objects to be represented have their faces or sides inclined to the picture, then the fifth article, which relates to the distance of the picture, must be different, as will be shewn in the next section.

The

*N. B.* The feat of a point upon the picture is produced by a right line drawn from any given point in the original object, perpendicular to the picture, the interfection of which line with the picture, is its feat.

SECT.  
I.  
Plate II.

*Example I. Page 32.*

S 1 is the feat upon the picture of the angle e of the square; it is also the feat of f, because both those points are in the line C S 1, which *represents* a line perpendicular to the picture.

Also in Plate III. Fig. 2, the feat of the angle P of the building upon the picture is at S, which is further explained by the geometrical plan, the angle of the building upon the ground being at O, and the line O S being perpendicular to the picture, therefore S is the feat of the point O upon the picture.

PLATE  
III.

The feat of a point or line upon the picture, or upon the representation of any plane, is further considered in the fourth section.

*The Scale.*

As no true representation of any original object can be obtained, unless that representation be drawn to a scale, so that all the parts may be in proportion to each other, and also to the original object; and as many students in art are quite uninformed of the necessary principle, it will not be improper to give some hints for the construction and application of a scale.

\* Upon any part of the picture, or upon a separate paper, draw a

\* It is needless to observe, that the scale must always be proportioned to the size of the canvass, tablet, or paper, upon which the object is drawn.

In the example, the scale is marked by the figures, 4, 8, 12, &c. for the space between every figure is intended to express four feet.

F 2

right

SECT. I. right line, or two lines, as in Plate III.; then, with the compasses  
 I. extended to any measure, suppose one quarter, or one half of an inch,  
 Plate III. as may be most convenient, set on upon the lines as many of those  
 equal spaces or parts as may be necessary, suppose six; then divide  
 one of those spaces into 12 equal parts, and let the greater spaces be  
 considered as feet, and the lesser as inches; by such scale, not only  
 the object must be proportioned, but also the height of the horizontal  
 line, and the place of the eye, or distance of the picture, must be  
 disposed. Inattention to these necessary considerations, has not only  
 obscured the instructions of many writers on the science, but also  
 produced distortion in their examples and diagrams\*.

In the course of this work, the terms given, or supposed measure, are sometimes employed, it may therefore be proper to explain what is meant by the author in those expressions.

When any object or building already constructed, is to be accurately represented in Perspective, the measures of all the parts of such original object should be obtained—these are the *given* measures. The same may be said of an original sketch accurately figured, in both which cases the measures must be applied by a scale.

But when a picture or drawing is to be made of an object, in which general proportions only are required, sufficient to produce a good effect, then the measures may be supposed, in such proportion, as may best answer the intention of the artist, without regard to a scale.

\* See figure 24 in Dr. Brook Taylor's first Treatise, which, though an elegant problem, is yet very ill drawn, and therefore not easily understood.

See also several of the schemes in Noble's Perspective.



## S E C T I O N II.

*Containing Examples of Objects in which the Lines and Planes are parallel and perpendicular to the Picture.*

Plate IV. Fig. 1.

**T**HIS figure represents a pavement of squares, upon which are placed two blocks; the sides of the squares are each 2 feet in dimensions.\* PLATE IV.

The block, B 1, is 2 feet by 2 feet 3 inches, at the base, or end upon which it stands, and 4 feet high. Its seat or situation upon the ground, is nearly at the middle of the second square, beyond the picture; and upon part of the fifth and sixth from the station; which station may be considered as at the point S.

The prism or pillar, B 2, is 2 feet square at the base, and 18 feet 6 inches high; and it stands upon the third square of the pavement, beyond the picture, in the first row next the wall.

The breadth of the picture, or tablet, contains twelve squares, with a margin of one foot breadth on each side, which margin is also expressed at the farther end, but not in front.

H is the horizontal line, which is drawn 6 feet  $\frac{1}{2}$  above the base line of the picture, which base line is A m. C is the center of the

\* The figures in this Plate are both drawn to the same scale which is given under Fig. 1.

p'cture.

SECT.  
II.  
Plate IV.

picture. D 1, D 2, are the points of distance which are set off each way from the center C, about 17 feet  $\frac{1}{2}$ .

*Process for the Pavement.*

For the squares proceed as follows: \*Take 1 foot by the compasses from the scale, and set it from either end of the base line, or bottom of the picture, as from y to X, or from o to m, which space is equal to the breadth of the margin.

Then take two feet from the scale, and set that measure on the same line from X to a, to b, to c, and continue those measures to m, and from every one of those divisions, draw lines to the center of the picture C, and those lines will produce the indefinite appearances of those sides of the squares which are perpendicular to the picture. From the point m in the base line, draw a line to the point of distance D 1, and where that line cuts or intersects the lines which are drawn to C, will give the apparent depths of the squares, as they recede from the picture.

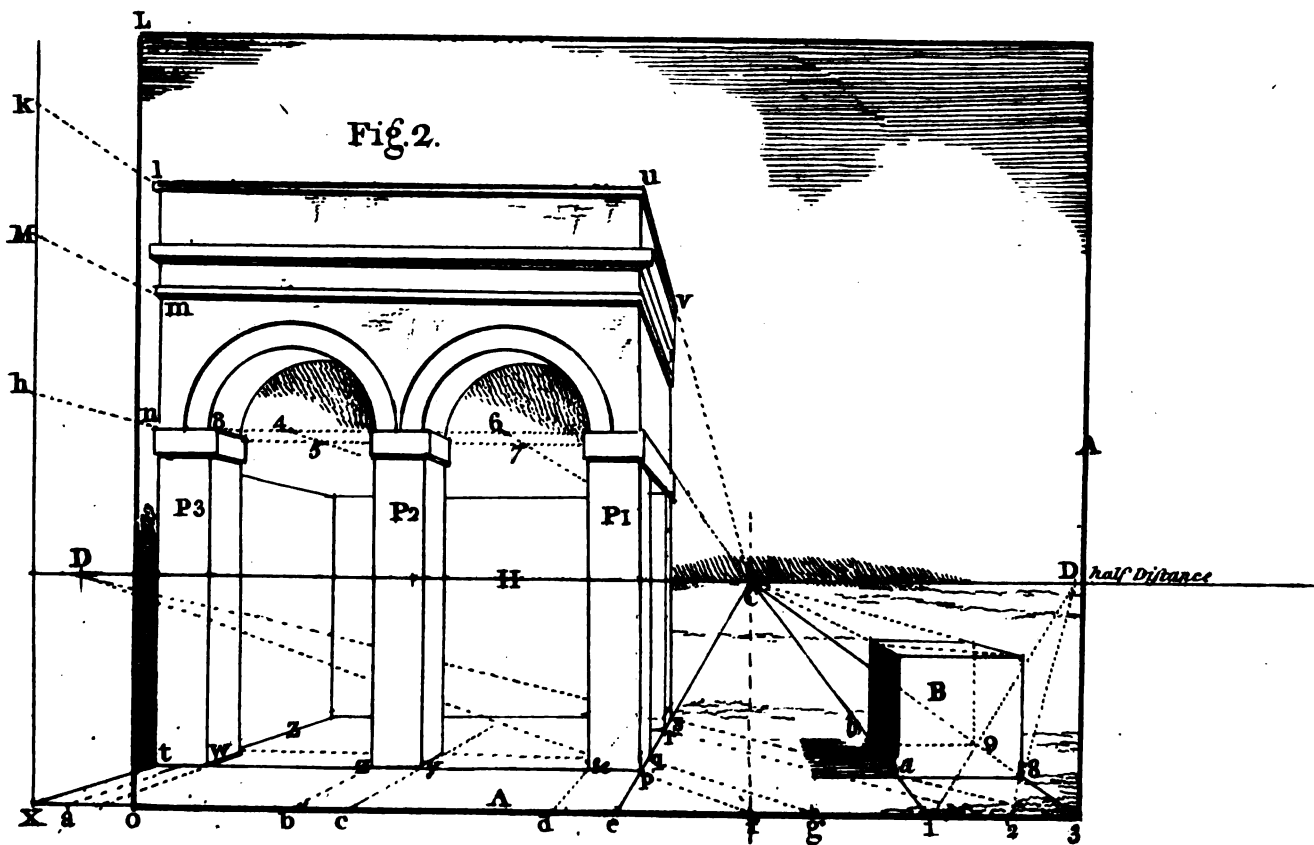
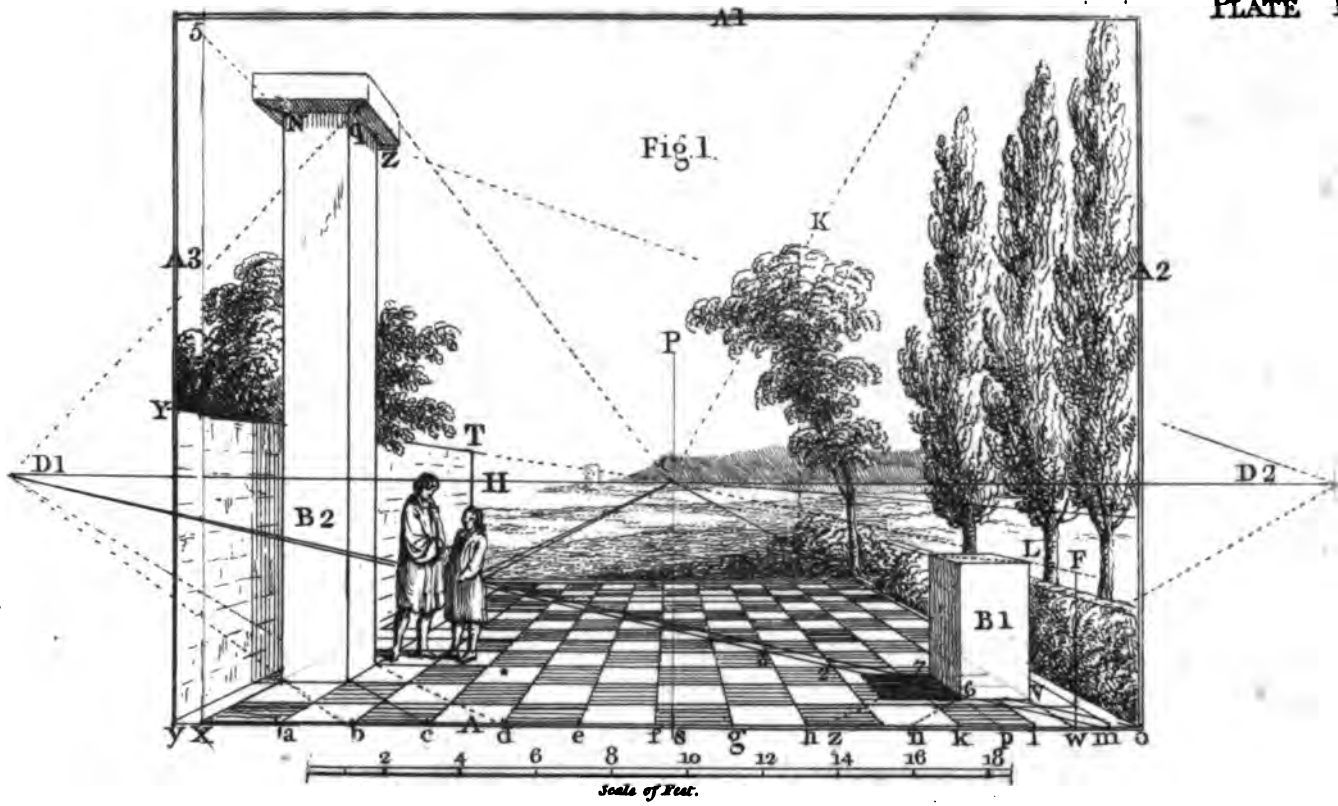
Lastly, through all the points in which the line D 1 m intersects or cuts the lines that are drawn converging to C, (as at the points 2, 3,) draw lines parallel to the ground line, or base of the picture, and the general figure of the pavement will be obtained, which requires nothing more than to be distinguished by the alternate colours of the squares.

To represent the Block B 1, proceed as follows:

Let the point w, be the seat of the angle V of the block upon the base line.

\* This example is bounded by the lines A, A 1, A 2, A 3, which lines, in subjects similar to this, should generally be first drawn, that the whole view may be determined with certainty and elegance, particularly in a drawing. But if a picture is intended, the canvass should be made in proportion to the width and height required, and the base line drawn a little above the lower edge.

From





From w, set on upon the ground line to p, two feet by the scale, and from w and p draw lines to C, the center of the picture. SECT.  
II.  
Plate IV.

Then from the point p, set on to n the measure equal the distance which the block is beyond the picture, which, in this example, is about 2 feet four inches by the scale; and from n, set on to z in the base line, the measure of the depth of the block, nearly 2 feet; and from the points z and n, draw right lines to the point of distance D 2, and their intersections, with the line which is drawn from p to the center C, gives the apparent depth of the block, as at the points 6 and 7; at which points draw lines *parallel* to the horizontal line, that may intersect the line drawn from w to C, and the plan of the block will be obtained.

Complete the figure as follows: At the four angles of the Perspective plan, draw lines perpendicular to the horizontal line, and determine their heights thus; at the point w draw a line perpendicular to the ground line, and upon it set up the given height of the block, four feet, as from w to F, and from F draw a line to the center of the picture C, which will intersect the angle of the block at L, and consequently give the height required.

The prism, or block B 2, stands upon one of the squares in the third row beyond the picture, and the sixth, reckoning from the station S towards the left: the base is of the same dimensions with the squares. Therefore, at the angles of the square, draw lines perpendicular to the horizon, and determine their height as follows:

At the point X in the ground line, draw a line perpendicular to the horizontal line, as the line X 5, and upon it set up the given height of the prism, as from X to 5; from 5, draw a line to C, the center of the picture, which will cut the angle of the prism at N, and determine the required height.

At the point N draw a line parallel to the horizon, which will cut the other perpendicular line at q, from which draw a line to the  
center

SECT. center of the picture C, which will give the point Z, and determine  
 II. the height and form of the prism without the cap. \*  
 Plate IV.

The representation of the wall Y, T, is obtained by setting up the known height from the base line y to Y, and from Y, drawing a line to the center of the picture C; and as the wall extends to the end of the pavement, nothing more is required than to draw a line at the farther angle of the pavement perpendicular to the horizon, which will give the intersection T, and determine the limits of the wall.

### *A Building with Arches.*

Plate IV. Fig. 2, is an example of a building with two arches, which may be supposed as intended to contain a garden seat. Its dimensions are as follows: The height is - - -  $18\frac{1}{2}$  feet.

Width - - -  $15\frac{1}{2}$

Depth - - -  $8\frac{1}{2}$

Height of the piers from the ground to the spring of the arch  $10\frac{1}{2}$ .

The building is three feet six inches beyond the picture.

H is the horizontal line, which is six feet above the base line of the picture. C is the center of the picture, and D 1, the distance, which is about  $17\frac{1}{2}$  feet.

Let the point e, on the base line, be the seat on the picture of the angle P of the building.

From e draw a right line to the center of the picture C.

Then set on upon the base line from e to f, the distance which the object is beyond the picture, which is 3 feet 6 inches by the scale, and from f draw a line to D 1, and its intersection with the line drawn from

\* The covering or cap of the block B 2, is omitted in these instructions, but may be seen in another part of the work. It must be observed, that the whole of the process by which the representations of these blocks are obtained, is but a repetition of that which was first taught in the rudiments, page 32.

e to C will be p, which represents the seat upon the *ground* of that angle of the building, which is nearest to the spectator.

SECT.  
II.  
Plate IV.

At the point o continue the base line to any convenient length, as to X, and from the point e set on to X the whole breadth of the building, 15 feet six inches, and from X, draw a line to the center of the picture C.

Then at the point p, draw a line parallel to the horizon, or to the base line of the picture, as the line P t, which will mark the apparent width upon the ground of the front of the building.

From the point f, set on to s in the base line, the depth of the building, 8 feet 6 inches, and draw a line from s to D 1, which will intersect the line e C in S, consequently P S is the apparent depth of the building.

Next determine the height as follows: At the points, t, p, s, draw lines perpendicular to the horizon, as the lines t l, p u, and S v.

Then at the point X in the base line, draw the line X k, perpendicular to the horizon, and from X, set up the whole height of the building, by the scale 18 feet 3 inches, to k, and from k, draw a line to the center of the picture C, which will intersect the line t l in l, therefore, t l is the apparent height of the building.

At l draw the line l u parallel to the horizon, and from the intersection, u, draw a line to the center of the picture, which will give the intersection v, consequently, the lines p t, t l, l u, u v, v s, and p s, determine the general form or outline of the building.

Then find the proportions of the piers and arches as follows:

The piers are all of the same dimensions, and the arches are similar to each other; their measures are as follows:

The piers are each 1 foot 8 inches square.

The opening of the arches 5 foot 3 inches.

From the point e, which is the seat of the angle p of the building

G

upon

SECT. II.  
 Plate IV. upon the base line, set on to d, the breadth of the pier, 1 foot 8 inches, and from d to c, the width of the arch, 5 feet 3 inches; from c to d the breadth of the second pier, and then the second arch, and lastly, the third pier, observing that these different proportions must all coincide with the whole measure of the front, as indicated from e to X. From every one of those points draw lines to the center of the picture C, and their intersections with the line t p will mark the apparent widths of the piers and arches, as at the points w, z, y, at which points draw lines perpendicular to the horizon, which will express the faces of the piers with the apertures of the arches.

Their heights must next be found as follows:

Upon the vertical line X k, set up from X to h, the height of the piers, 10 feet 8 inches by the scale, and from h draw a line to C, and its intersection with the angle of the building at n, will be the apparent height of the piers.

Then find their depths as follows: At the point f in the base line, set off to G, the measure of the depth of the piers, which, in this example, is equal to the fronts; and from g draw a line to the distance D, and the intersection q with the line e C, will determine the apparent depth of that pier.

To determine the others, draw a line at q parallel to the base line, which, by intersecting the lines c C, and f C, will determine the apparent widths of the other piers, as expressed by the point w.

The depth of the back pier is also found by the same process, that is, by marking the measure from 3 to 2 upon the base line; which measure, being transferred by a line drawn to the distance of the picture D, will give the point r, the apparent width of the back pier.

The places and dimensions of the fasciæ upon the upper part of the building, are determined by the same process which was employed



ployed to obtain the height of the building, that is, by setting the proper measures upon the line  $xk$ , and transferring them to the angle of the building  $fl$ , by lines drawn to the center of the picture  $C$ , which is \* sufficiently demonstrated by the points  $m$  and  $n$ .

SECT.  
II.  
Plate IV.

It would be vain to attempt an explanation of the process necessary for the construction of every small part of the building represented in this example; it is sufficient to observe, that the thickness of the wall upon the side is marked upon the base line from  $X$  to  $a$ , which is transferred by the center of the picture  $C$ , and gives the lower line  $Z$  of the side of the interior of the building.

The student will clearly comprehend the construction of the other parts, by applying a ruler to the center of the picture  $C$  in the example, which will demonstrate the methods for measuring all heights, and to the distance of the picture  $D$  for all depths.

Thus the heights upon the building of the parts  $l, m, n$ , are determined by lines drawn from  $k, M, h$ , to the center of the picture  $C$ , and the depths of the piers and building  $P, q, s$ , are found by lines drawn to the distance of the picture  $D$ , from the measures  $f, g, s$ , set on the base line, as at the points  $2$  and  $3$ .

*Example of a House whose Front  $E$  is parallel, and whose Side  $G$  is perpendicular to the Picture.*

Fig. 1. Plate III.

The base line of the picture is marked by its title.  $HH$  is the horizontal line; the points of distance are marked  $D$ , and distance; either of which may be employed, but  $D$  is the most convenient.

PLATE  
III.

\* The manner of finding the centers of the arches, and describing the archivaults, and soffits, is given in Page 66, Plate VII. Fig. 3.

S E C T.

II.

Plate III.

The building is 2 feet beyond the picture.

The front E is  $13\frac{1}{2}$  feet wide.

The side G is 16 feet deep.

The height 24 feet.

Let a be supposed the seat upon the *picture*, of the angle of the building nearest the spectator.

From a, draw a right line to the center of the picture C, as the line a K.

Then from a, set on upon the base line to e, 2 feet by the scale, equal the distance which the house is beyond the picture; and from e draw a line to the distance D, which will cut the line a C at S, consequently, the point S will represent the angle of the building nearest to the spectator.

From a, upon the base line, set on to b, the width of the front of the building, 13 feet 6 inches; and from b draw a right line to C, the center of the picture. At the point S draw a line parallel to the base line, as S g, which will be the base line of the front of the building.

Find the depth of the building as follows:

Set on from e in the base line to h, 16 feet by the scale, and from h draw a right line to the distance of the picture D, and its intersection K, with the line drawn from a to C, will be the apparent depth of the building.

At the points S, g, K, draw lines perpendicular to the horizon, as the lines g X 2, S V, and K m.

Then find the height of the building as follows:

At b in the base line, which is the seat on the *picture* of the angle g of the building, draw the vertical line b m, and upon that line, set up the height 24 feet to o, from which point, draw a line to C, the center of the picture, and its intersection with the line X 2, g will be the height of the building

At

At X 2, draw a line parallel to the horizon, as X 2, V, and from V, draw another line to the center of the picture C, which will produce the intersection m: then will the lines g, X 2, d v, and K n, represent the outlines of the building. It remains to find the representations of the door and window, but it is not necessary that every part should be minutely described, which would be but a tedious repetition of the same process applied to different parts; therefore, no more will be given than to find the appearance of the door, and the height of the top of the middle window, which are obtained by the following process:

SECT.  
II.  
Plate III.

From a in the base line, set on to d the width of the pier, and from d on the same line, set on to c the width of the opening of the door; and from these two points, d and c, draw lines to the center of the picture C, and the intersections n i of those lines, with the base line g s of the building, will give the dimensions for the width of the aperture of the door; as the space n, i, is the breadth required.

Then find the height of the door as follows:

Upon the vertical line b, set up from the base line the height of the door to y, 6 feet by the scale, and draw a line to the center of the picture C, which will intersect the angle g, X 2, of the building at 4, then from the points n i, draw two vertical lines to express the sides of the door, and from 4, draw a right line parallel to the horizon, which will express the top of the door.

The middle window is of the same width with the door, consequently, the sides of the door, continued upward, will produce the sides of the window, while its height is found by the same process which is employed for the height of the door; the measure being set up upon the vertical line b m, from y to w, and transferred by the center of the picture C, to the plane E, as at the point s, from which, a line drawn parallel to the horizon, will give the top of the window.

It

SECT.  
II.  
Plate III.

\* It will be proper to consider the examples in Plate III. in relation to the planes of which the objects are composed, and also to mark other circumstances, with which the student in Perspective ought to be well informed.

All the buildings in Fig. 1 and 2, Plate III. are composed of planes, and the doors and windows are to be considered as apertures in those planes; the dimensions of which must be found by marking their measures on the intersections of the picture, and then transferring those measures by the center of the picture, to the edges of the planes, in which those apertures are seated.

*A Building with Wings parallel to the Picture.*

Plate V. Fig. 1 and 2.

PLATE  
V.

Both examples in the plate must be considered as drawn from the same object; Fig. 2 being an enlarged part of Fig. 1, the better to explain the process.

The building consists of a center, with a small arcade, uniting two wings, with an area in the middle.

The scale is adapted to the small example, which is half the size of the large one; therefore, what is marked 10 feet in the scale, must be considered as no more than 5 feet, when applied to the large example, Fig. 2.

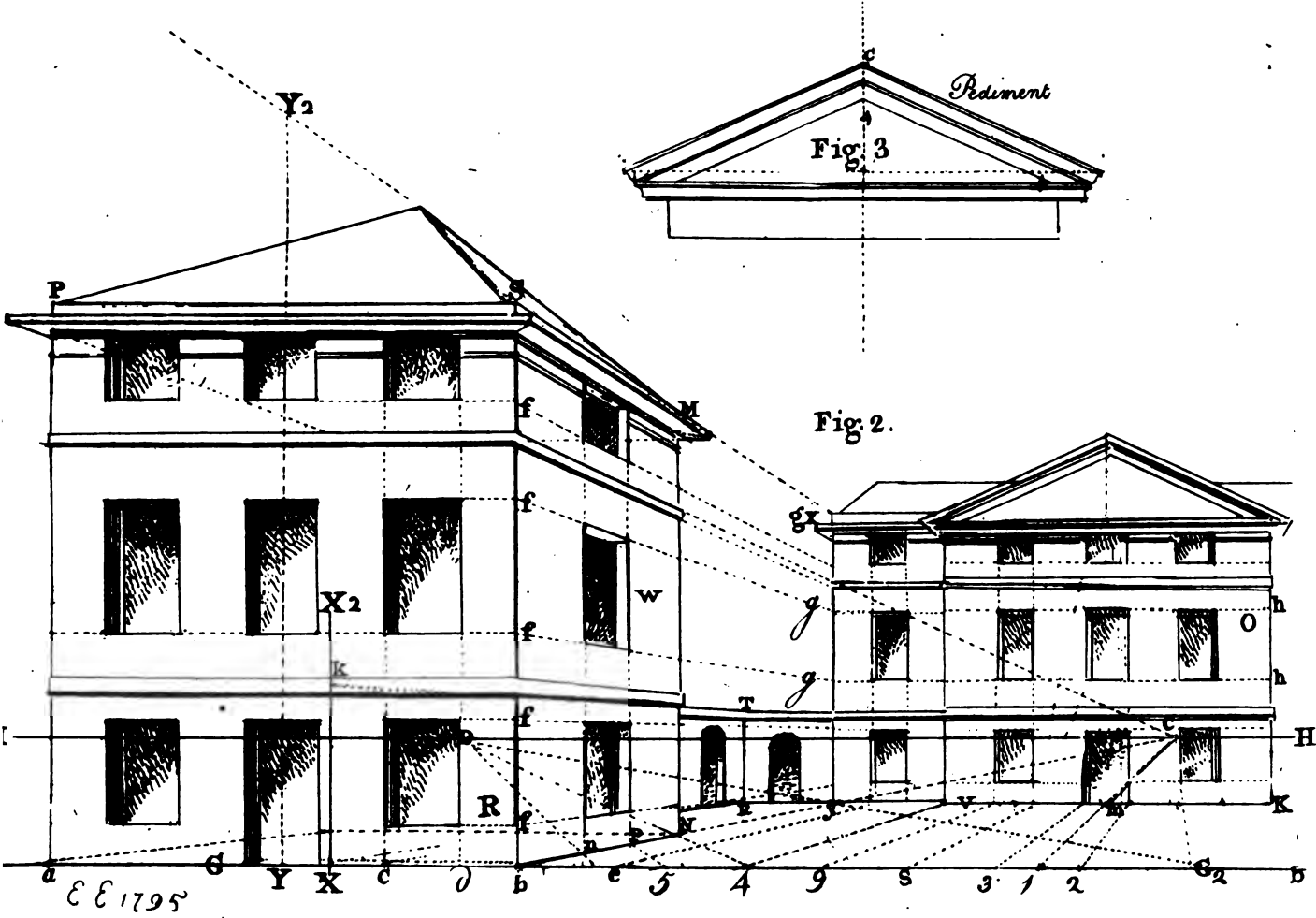
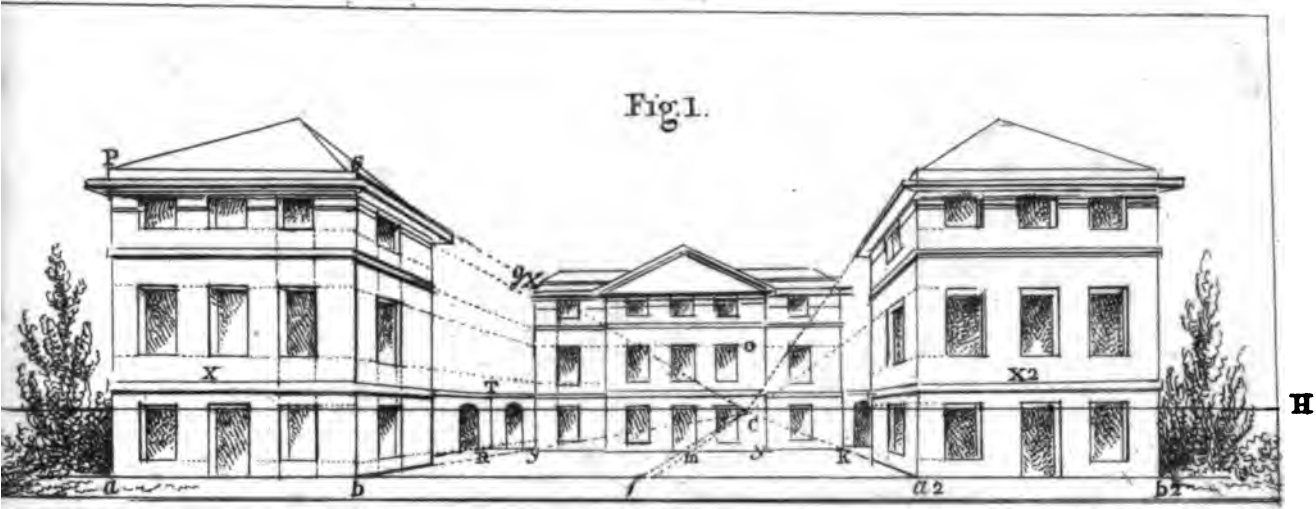
The dimensions are as follows:

The center part of the building is 66 feet wide.

The plans of the wings are  $28\frac{1}{2}$  feet square, and have the same height with the center building, which is 37 feet from *a* to *p*, the top of the blocking course.

\* The semicircular window, and the other parts of the building, are produced by rules, which are given in the following examples.

The





The width of the area, between the wings, is equal to the width of the center building, which is 66 feet; consequently, the whole extent of the wings and area is 123 feet in front, from *a* to *b* 2, Fig. 1.

SECT.  
II.  
Plate V.

The area beyond the wings, is 12 feet on each side wider than in front, so that its width between the arcades is 90 feet.

The depth of the area from the front of the wings to the front of the center building, is  $87\frac{1}{2}$  feet.

\* The height of the eye is 8 feet, and the distance of the picture about 90 feet.

In drawing objects of this kind, proceed as follows:

Draw the ground line, or interfection of the picture, *a b* 2, Fig. 1. or *G G* 2, Fig. 2, and upon that line determine the center 1 of the whole breadth of the edifice; and from the center 1, mark half the width of the area between the wings, 32 feet each way, as at *b* and *a* 2, Fig. 1; and from *b a*, each way the width of the wings *b a*,  $28\frac{1}{2}$  feet.

Then draw the faces or fronts of the wings geometrically, as *X* 2, Fig. 2. and dispose the windows and doors by their true measures, beginning with the inward pier *R*, and marking off the piers and windows alternately, to the proper dimensions, as from *b* to *a*, in both figures.

Having proceeded thus far, mark the height of the eye, and draw the horizontal line *H H*.

Then mark the center of the picture at pleasure, as at *C*, after which, draw the sides of the wings.

\* The height of the eye is raised two feet above the common height, for the sake of producing a more pleasing effect in the appearance of the area, than could have been obtained by the common height.

In this example it must be observed, that the center of the picture *C*, is not in the center of the building, but on one side, as recommended in the subsequent discourse; by this means the building is better explained, and appears more picturesque than it would do, if the center of the picture coincided with the middle of the door.

It

SECT. II. It must be observed, that in the example, Fig. 2, the plate not being sufficiently large to contain the whole distance of the picture, the half only is employed; but, as the scale is fitted to the small example, the numbers with which it is marked, correspond in numbers with the given dimensions, although no more than equal to half the proportion of the larger example.

Plate V.

Thus the distance of the picture is 90 feet, the half of which is 45 feet; therefore, from the center of the picture C, set on to D, 90 feet by the *given scale*, which would be no more than 45 feet, if the scale were proportioned to the large example, Fig. 2.

Having thus fixed the point of distance to half its length, continue to employ the same proportion and scale, for the measures of the sides of the wings, as follows:

The plan of the wing X 2, Fig. 2. is a square, each side 28  $\frac{1}{2}$  feet, therefore, take that measure from the given scale, and set it off from the angle b, to the point 4, on the base line; then having drawn a line from the angle B to the center of the picture C, draw another line from 4 to D, and their mutual intersection at N, will mark the depth of the side of the wing, at which point draw the vertical line N M.

It must be observed, that the application of the half distance and measure, is only to proportion those lines which represent lines perpendicular to the picture, not those which are parallel to it; as the line b N, Fig. 2, is perpendicular to the picture, representing the depth of the wing; but the fronts which are parallel to the picture, must be determined by the whole measure.

Then from the point S, in the upper angle of the front, draw a line to the center of the picture C, which will intersect the line N M, and produce the representation of the outlines of the side of the wing.



Complete the side as follows:

The windows are 8 feet wide, and of the same height with those of the front, and the piers are 10 feet 5 inches wide each.

SECT.  
II.  
Plate V.

Therefore, take 10 feet 5 inches from the scale, and set it on from the angle b to the point e, and from e to 5, the width of the window, by the scale 8 feet, and from 5 to 4, the width of the pier as before, and from the points e, 5, 4, draw lines to the point of distance, D, and the intersection of those lines, with the line that is drawn from b to the center of the picture, as the points n p, will give the perspective proportionate width of the window, at which points, draw lines perpendicular to the horizon, which will determine the width of all the windows on that side.

To determine their heights, continue the bottom and top lines of the windows in the front X 2, till they intersect the angle b S of the wing, as at the points f, f; and, from those points, draw lines to the center of the picture C, which will determine the height of the windows in the side w, as marked by the example.

Having thus far determined the forms and general proportions of the wings, proceed to describe the center part of the building O, which, as before observed, is equal to the space between the wings, 66 feet.

The depth of the area, from the front of the wings, to the front of the center building, is  $87\frac{1}{2}$  feet, which is 57 feet more than the depth of the wing; therefore, take 57 feet from the scale, and set it upon the base line from the point 4 to the point G 2, and from G 2, draw a right line to the half distance D, and its intersection y, with the line that is drawn from the nearest angle b of the wing, to the center of the picture C, will give the depth of the area.

At the point y, draw a line parallel to the horizontal line as v R, which will be the base line of the center building; then determine

H

its

SECT. II. its breadth by continuing the side of the other wing, to the center of the picture C, as from *a* 2, in Fig. 1, which will give the intersection K, and consequently determine the width of the center building, as *y* K in the small figure.

Plate V.

To find the apparent height, draw the line *g, g, g*, Fig. 2. perpendicular to the horizon, at the intersection *y*, and continue the line from the blocking course S, on the side of the wing, to the center of the picture C, and the intersection *g x*, Fig. 1, or Fig. 2, will be the apparent height of the center building O.

Complete the general form of the front O, observing the break where the \* pediment springs, and determine the door and windows as follows :

In the base or ground line of both examples, the point 1 is the middle of the extent of the whole building, consequently, it may be considered as a point in a right line, drawn from the middle of the door; therefore, draw a right line from 1 to the center of the picture C, and its intersection, with the lower line V of the center building, will give the representation of the middle of the door as at *m*.

Find the width of the door by setting its real width by the scale, 5 feet, half of which must be marked on the ground line, each way from the point 1, as the points 2, 3, Fig. 2.

Transfer that measure to the front of the building, by lines drawn from 3 and 2 to the center of the picture C, and the intersections of those lines, with the base line V of the center building, will give the

\* To those who are not acquainted with the principles of architecture, it is necessary to observe, that all pediments have certain proportions for their height or pitch, the best medium of which is, two ninths of its width. Thus in example, Plate V. Fig. 3. *a b* is the width of the pediment, therefore the dotted line *a b*, is divided into nine equal parts, two of which are set up from 3 to C, consequently, C is the height of the pediment, to which point, draw lines from *a* and *b*, and the general outlines of the pediment will be determined.

apparent

apparent breadth of the distant door, as is expressed in the example, SECT.  
II.  
Fig. 2. Plate V.

For the proportions of the piers and windows pursue the same process as for the door. Thus, upon the ground line  $G G 2$ , set off from 3 to 8, the width of the pier, and from 8 to 9, the width of the window; and transfer those measures to the base line  $V m$  of the distant front, by lines drawn to the center of the picture  $C$ , and the intersections of those lines, with the line  $V K$ , will give the apparent breadth of the windows; from which intersections, draw lines perpendicular to the horizon, which will determine the breadth of the windows.

Then find the height of the windows in the distant building, by continuing the lines of the tops and bottoms of those which are on the sides of the wings, as from  $f f$ , &c. to the center of the picture  $C$ , and the intersections of those lines with the angles  $g$ , \* will mark the dimensions required, as at the points  $g g$ ; which dimensions must be transferred to the spaces for the windows, by lines drawn parallel to the horizon, as the lines  $g h$ ,  $g h$ .

Fig. 2. For the width of the area beyond the wings set the additional measure, 12 feet, from  $b$  to  $X$  on the base line, and draw the vertical line  $X X 2$ . From the point  $X$ , draw a line to the center of the picture  $C$ , and extend the base line  $V A$ , of the center part of the building, till it intersects the line  $X C$  in the point  $R$ ; and draw the vertical line  $R T$ , which will be the remote angle of the arcade, the height of which is marked from  $X$  to  $k$ , in the line  $X X 2$ , and is transferred to  $T$  by a line drawn from  $k$  to the center of the picture.

In drawing perspective views of buildings, similar to this example, it cannot be expected that all the small parts should be made out by

\* The pediment is illustrated and explained in the third Section, Plate 30.

SECT. II. the strict rules of the science, yet the general form must be decided with accuracy; after which the smaller parts, such as the members of the cornice, the dressings of the doors, windows, and other inferior ornaments, may be finished by the eye, particularly in small drawings; but in larger works, the ornamental parts must be added agreeably to the rules which are given in the succeeding parts of this work.

Plate V.

It is also prudent never to describe the exterior view of any single building as distant from the picture, but to draw it as commencing at the intersection of the picture; and afterwards to introduce a foreground, as indicated in Fig. 1, where the line a b 2, is the intersection or ground line, although drawn above the lower limits of the picture; by this method, great trouble and much time will be saved, especially when the object is inclined to the picture.

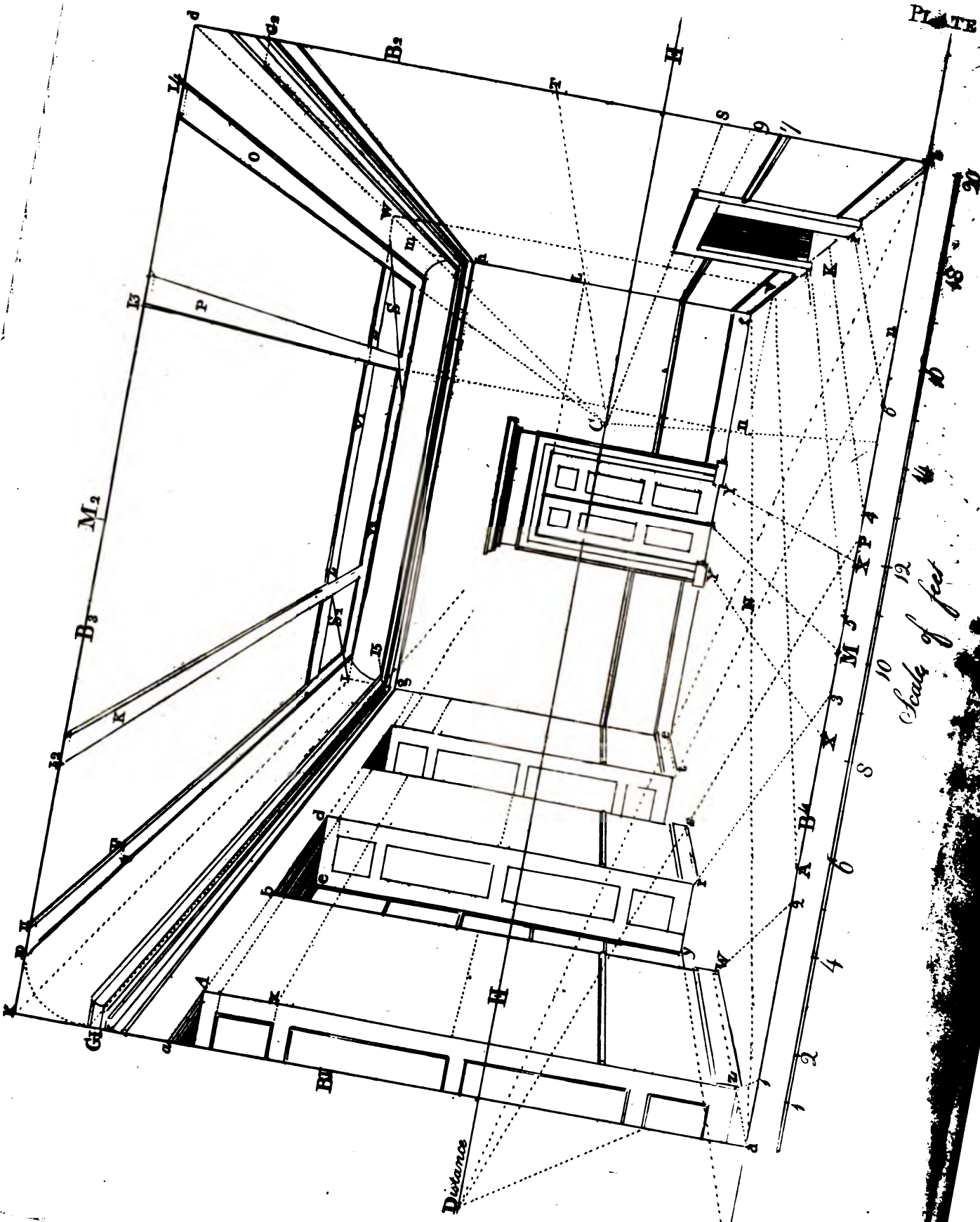
The heights and constructions of the roofs of the wings are determined by the process given for the example, Fig. 3. in Plate IX. the general form of that figure being exactly the same with the wings in Plate V.

The pediment of the center part of the building having all its parts parallel to the picture, may be drawn almost geometrically; especially when the representation is small and distant from the picture, as in this example; but when large, those parts must be determined by the rules given for the explanation of the figures in Plates IX and X. which exhibit examples of mouldings parallel and perpendicular to the picture.

*Interior of a Room whose Sides are parallel and perpendicular to the Picture.*

PLATE VI.

In Plate VI. is an example representing the inside of a chamber, which may be supposed a drawing-room, finished with a cove and a flat ceiling, divided into compartments.



Scale of feet

Distances



The proportions are as follows:

The whole length of the room is 26 feet 3 inches.

The width 20 feet.

The height, including the cove, 15 feet.

The height of the windows 12 feet.

Their width 4 feet 3 inches.

\* The width of the piers 3 feet 9 inches.

The height of the door 7 feet 8 inches.

The width 3 feet 6 inches.

The chimney 3 feet 6 inches high, by 4 feet 3 inches wide.

Before the student proceeds to operation, it will be proper for him to observe, that in this example the spectator is supposed to be standing in the room, therefore the whole of it is not seen by him, because a part lies behind the angle of his vision; hence it follows, that all the first pier, and more than half of the nearest window, cannot be introduced into the picture, because it cannot be seen by the spectator; this must ever be the case in all interior views. The spectator being prevented by the limits of the room, or building, from retiring to such distance as would allow him to comprehend the whole within the angle of vision; therefore a part must be omitted to produce a natural representation, as in this example: Yet, by the rules of the science, the room might be represented to its full length, but such representation would give a false idea of the dimensions, by making it appear longer than the original, an effect which ought ever to be avoided †.

The operation is as follows:

\* The second pier is rather less.

† A portion of the room, equal to 6 feet 3 inches, is omitted as not falling into the angle of vision.

Draw

SECT. II.   
 Plate VI. Draw the boundary lines, or limits of the picture, equal to the given measures of the width and height of the room, as the lines B 1, B 2, B 3, B 4.

Then draw the horizontal line at a proper height above the base line, or bottom of the picture, as the line H H is the horizontal line, which is 5 feet 6 inches above the line a, B 4, b.

Then determine the center of the picture C, and also the point of distance \*, which, in this example, is 16 feet by the scale, from C.

Having thus determined the center and distance, draw right lines from the four angles, a, b, K, d, to the center of the picture C.

Then, on the base line, set off from the point a, the measure of the depth of the room, as from a to b, which, in this example, is no more than 20 feet, that measure being as much as can be seen by a spectator standing in the room.

From b, draw a right line to the point of distance, which will intersect the line that is drawn from a to C in the point e, consequently, the space from a to e represents the visible depth of the room.

At the point e, draw a right line parallel to the base line of the picture, as the line e f, intersecting the line which is drawn from the point b to C in the point f.

Then is the line e f the base of the farther end, and the points e f the farther angles or corners of the room.

At the points e and f draw lines perpendicular to the horizontal line, as the lines e g, and f h, which may intersect those lines which are drawn from the upper angles c and d, in the points I and m, which lines, with those before drawn, express the general form of the room.

\* The distance of the picture is marked by the word *distance*.



Then find the representations of the piers and windows as follows :

SECT.  
II.  
Plate VI.

At the point *b* in the base line, which is the point by which the apparent length of the room was determined, set on from *b* to *n*, the depth of the farthest pier, equal 3 feet 6 inches by the scale; and from *n*, draw a right line to the distance of the picture, and its intersection, with the line *a c*, as at *t*, gives the apparent width of the farthest pier.

Then from the point *n* upon the base line, continue the alternate measures of the windows and piers, as at the points *P*, 3, 2, 1; and from those points, as before directed, draw lines to the distance of the picture, which will produce the intersections *t*, *s*, *r*, *w*, *z*, the apparent breadths of the windows and piers.

Then determine their heights as follows :

Upon the line *B 1*, set up the measure 12 feet by the scale, from *a* to *a*, and draw a right line from *a* to the center of the picture, and from the points *z*, *w*, *r*, *s*, *t*, draw lines parallel to *B 1*, and the intersection of those lines, with that which is drawn from *a* to *C*, as at *b d*, will give the general forms of the spaces for the windows.

After having determined the piers and windows, describe the recesses as follows :

The point *a*, in the base line, expresses the extreme width of the room on the left of the spectator; but the recesses extend beyond that point, nearly equal to the thickness of the wall of the building. Therefore, continue the base line from *a*, and set on from *a* to *R*, the depth of the recess equal 2 feet; and from *R*, draw a right line to *C*, the center of the picture; and from the points *t*, *r*, *z*, draw lines parallel to the base line, as the line *r y* in the second window; which line marks the apparent depth of the recess upon the floor.

At *d*, draw the line *d e* parallel to the floor, and at *y*, draw the line

*y e* per-

SECT. *ye* perpendicular to the horizontal line, or, which is the same in effect, parallel to the line B 1.

II.  
Plate VI.

Through the point *e*, draw a line from the center of the picture, and the recess of the second window will be determined \*.

Then proceed to determine the door as follows :

This aperture being in the middle of the chamber, divide the base line into two equal parts, as at *M*, and from that point set off on each side to *XX*, half its width, 1 foot 9 inches, and from those points, draw lines to the center of the picture, and the intersections of those lines, with the line *ef*, will mark the apparent width of the door at *YY*.

To determine its height, take the measure from the scale 7 feet 9 inches, and set it up from *b* to *T* in the line B 2, and from *T*, draw a line to the center of the picture *C*, which will cut the line *fh* in the point *L*.

At the two points *YY*, draw lines perpendicular to the horizon, for the sides of the door; and from the point *L*, draw a right line parallel to the horizon, and the mutual intersections of those lines will determine the appearance of the width and height of the door.

The architrave, with the frieze and cornice, must be determined by the same process, which produces the width and height of the door: thus the measures of the width of the architrave must be marked on each side of *XX*, in the base line, and transferred by the center of the picture *C*, to the line *ef*, and the height of the frieze and cornice must be set above the point *T* in the line B 2, and transferred by the point *C* (which is the center of the picture) to the vertical line *fh*, which is the angle of the room; and from those

\* The other windows cannot be seen, the first being too near, and the third too distant.

points,

points, draw lines parallel to the horizon, which will determine the members both of the frieze and cornice.

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II.  
Plate VI.

The chimney in this example has no ornament, but a plain fascia, which furrounds the aperture.

To determine the representation of the chimney aperture, proceed as follows :

Through the further angle *f* of the room, draw a right line from the distance of the picture, that may intersect the base line, as the line *f n*, which passes through *f*, and intersects the base line in the point *a*. Then from the point *a*, set on upon the base line, 13 feet by the scale, to the point *4*, that being *half* the length of the room. On each side of the point *4*, set off half the width of the aperture of the chimney, 2 feet 1 inch to the points *5* and *6*, from which points, draw lines to the points of distance—\*, intersecting the side of the room in the points *k i*, which give the apparent width of the opening of the chimney.

For the height of the aperture of the chimney, set up the measure 3 feet 8 inches from the point *b* in the base line, to the point *9* in the line *B 2*, and draw a line to the center of the picture *C*.

Then from the point *k* and *i*, draw lines perpendicular to the horizontal line, and their intersections, with the line which is drawn from *9* to *C*, will determine the aperture of the chimney.

The height of the fur-base is about 3 feet 2 inches ; therefore, from the lower angle *b* of the room, set up that height by the scale, from the point *b* to the point *7* in the line *B 2*, and draw a line to the center of the picture *C*, which will represent the upper line of the fur-base ; under which describe the profile of the mouldings, and draw lines to *C*, and at the intersection of those lines, with the line *f h*,

\* The point should lie on the right side of the example, but is omitted, for want of space, on the plate ; but the lines drawn from the points *5* and *6* indicate its place.

SECT. draw the returns of the mouldings at the farther end of the room,  
 II. parallel to the horizontal line.  
 Plate VI.

The cornice must be delineated by the following process:

On either side of the room, as at G 1, or G 2, which points mark the extreme height of the cornice from the ground, draw the geometrical profiles of the mouldings, as the profile G 1, on the line B 1.

And from every angle of the projection, draw lines to the center of the picture C, producing those lines forward before the profile, until they terminate in the line which expresses the limits of the sides of the room, as at G 2 on the right side; for, as the cornice continues behind the spectator, no break or interruption can be seen.

To find the return of the cornice at the farther end of the room, determine the mitres, as at the points g and h, by drawing lines through the angles of the mouldings from the points of distance, as the line 15, which gives the mitre for the upper moulding, and will be a sufficient guide for the delineation of the parts, when the representation of the room is small; but in large works, where great accuracy is required, the representation must be obtained by the rules given in the last example of this Section, Plate X, in which is a full explanation of the process for representing mouldings that are parallel and perpendicular to the picture.

The cove and ceiling, with its compartments and soffits, are the next and last consideration; but, before the process is described, by which their representations are obtained, it will be proper to make some observations upon their forms.

The flat part of the ceiling is divided into nine compartments, by eight soffits or fasciæ, thus: F, K, P, O, are the soffits which pass lengthwise the room, and V 1, V 2, cross the ceiling transversely at the farther end; but the soffits at the nearest end of the room, parallel to

→

V 1 and

V 1 and V 2, are not seen, because they lie behind the view of the spectator.

SECT.  
II.  
Plate VI

The lines K 1, and d m, express the angles where the ceiling would intersect the sides of the room, provided there was no cove. Therefore, from K, the nearest point in that intersection, set off to the point 10, the measure equal to the projection of the cove, 1 foot 4 inches, and repeat the same projection at the point d, to 14, on the contrary side.

Then divide the space between the points, 10 and 14, into the proper divisions, marking off upon the line M 2, the places and breadths of the soffits F K, and P O, which, in the example, are about 9 inches wide; and from those divisions, draw lines to the center of the picture, as from 10, 11, 12, which lines will give the longitudinal soffits of the ceiling.

Then determine the representations of the transverse soffits, V 1 and V 2.

But, before the process is described, it will be proper to observe, that the soffit V 1, projects forward as far before the wall, at the farther end of the room, as those marked K and P, project beyond the sides; consequently, the line z z, of the soffit V 1, is the same distance from that wall, as the point 13 is from the point d, which, in the example, is 5 feet 9 inches.

From the point of distance, which lies on the right hand, draw the line N through the point f in the floor, that may intersect the base line, as at the intersection a.

From a, set on upon the base line to the point A, the distance of the inner or nearer edge of the soffit V 1, from the wall, equal 5 feet 9 inches; and from A, return a line to the point of distance, which will intersect the side of the room f b, in the point V, consequently, the portion of line f V upon the floor, is equal to the apparent pro-

I 2

jection

SECT. II. jection of the cove, together with the compartment S, and the two  
 Plate VI. soffits, V 1 and V 2, upon the ceiling.

At the point V on the floor, draw a line perpendicular to the horizon, as the line V w, and its intersection with the line m d, which is the intersection of the ceiling, with the side B 2 of the room, gives the point W.

At the point W, draw a right line parallel to the horizon, which will be the outer line of the soffit V 1, projecting forward before the farther end of the room.

The soffit V 2, is found by the same process with the former, therefore the instructions need not be repeated.

The pannels of the window shutters are determined by first drawing those of the nearest recess, and then transferring those proportions to the remote pannels, by lines drawn from the nearest, to the center of the picture, as from A to C, which sufficiently explains itself to the slightest inspection.

The pannels of the door may be determined by setting their widths upon the base line, between the points X X, and their heights upon the line B 2, and then transferring those measures to the proper place, by lines drawn to the center of the picture, in the same manner as was done for the door.

It must be observed, that those persons who understand the construction of pannels, need not apply real measures, but may proportion the parts by the eye, especially when the drawing or picture is small.

The process which is employed to obtain the true representation of the parts in this example, is the same that must determine the various features in the interior representations of all buildings, whose sides are parallel and perpendicular to the picture; for though they may be very different in appearance, yet the general principles are the same

fame in every species of architecture, seeing that all edifices are composed of right lines, disposed perpendicular, or parallel to the horizon.

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Plate VI.

For, suppose it be required to represent the interior view of St. Paul's, or Westminster Abbey, or any similar edifice, the first circumstance to be determined by the artist is, the height and width of the building; to which dimensions, the drawing or picture should correspond; then the breadths or thickneses of the piers, or columns, and also the spaces between them, should be proportioned to each other, by the same process, which is given in this example, for determining the piers and windows. The heights of all the smaller parts must also be found by the same process, as there can be no difference in the methods employed for obtaining their representations, whether the edifice be of few parts and plain, or of such as are more numerous and magnificent.

N. B. In the foregoing example, the measures for the piers and windows are arranged by the point which marks the *distant* angle of the room upon the base line of the picture, as at b, from which point the measures are continued to a. This process may be considered as inverse, because the nearer angle of the chamber cannot be seen, and therefore the measures are applied from that angle which can be seen.

In Plate VII. Fig. 1, is an example similar to the foregoing, but the parts are proportioned by the half distance which lies within the breadth of the room, and consequently within the limits of the picture, as at the point d  $\frac{1}{2}$ .

PLATE  
VII.

It also demonstrates how the measures may be transferred from one side to the other, so that much trouble may be prevented, and a confusion of lines avoided.

The general measures of the room are as follows:

The

SECT.  
II.  
Plate VII.

The width 17 feet from X to Y.

The length or depth 24 feet.

The height  $12\frac{1}{2}$  feet.

The first pier a, as also the farthest pier, 2 feet six inches wide.

Windows 3 feet wide.

The other piers 5 feet wide.

H H is the horizontal line, and the height of the eye is about 4 feet 9 inches.

The distance of the picture is at D, which is by the scale  $12\frac{1}{2}$  feet from C, the center of the picture.

From C to  $d\frac{1}{2}$ , is exactly half the space from C to D, consequently,  $d\frac{1}{2}$  is half the distance of the picture.

Therefore, to proportion the spaces on the sides of the room, take half the given or known measures of the parts required, and apply them as follows :

The first pier is only  $2\frac{1}{2}$  feet wide, therefore, take half that measure, 1 foot 3 inches by the scale, and set on the base line from X to 1, and from 1 to 2, set on 1 foot 6 inches, which is half of 3 feet, the width of the window; and from those points, draw lines to the half distance,  $d\frac{1}{2}$ , and the interfections of those lines, with the line X c, as at a b, will mark the apparent widths of the piers and windows.

Continue the alternate measures of the piers and windows by their half proportions upon the base line, as marked by the points 3, 4, 5, and on to the point 11; and from every one of those points, draw lines to the point  $d\frac{1}{2}$  as before, and the interfections of those lines, with the line which is drawn from the point X to C, the center of the picture, will give the apparent spaces of the windows, piers, and pilasters, with as much accuracy as if the whole measures were employed.

As



As it would occasion much trouble, and produce great confusion of lines, to determine all the parts required on the side B of the room opposite the windows, by the same process which was employed to determine the parts or divisions on the side A; those parts may be accurately marked by the following method:

SECT.  
II.  
Plate VII.

From every one of the divisions, at the lower angles of the pilasters, draw right lines parallel to the base line, as the line *z K*, which lines will give the divisions for the parts required, as the point *k* is the nearest angle of the second pilaster on the side B, exactly opposite to the pilaster *z* on the side A.

The process which is here given, is applicable to the interior representation of every building, whose opposite sides are similar to each other; for, having found by the center and distance\* of the picture, the necessary divisions of the parts on either side, as may be most convenient; the parts on the opposite are defined, by drawing lines parallel to the base line of the picture, from the points in the side upon which the measures have been before determined, to the lower line of the contrary side, as the line *K Z*, drawn parallel to the base line *X Y*, determines the point *K* exactly opposite the point *Z*, therefore the point *K* is the nearest angle of the second pilaster, on the side B, exactly opposite to the nearest angle *Z* of the second pilaster, on the side A of the room.

In this example, the full length of the room is described, as from *Y* to *W*, but the effect of the whole, in consequence of so much being shewn, is less pleasing, and not so natural, as in the foregoing example; for the space *B*, between the nearest pilasters on the left side, appears too wide in proportion to the next space *D*, and the aperture of the chimney does not seem to be in the middle of the side, but more remote in the room; yet, it is perfectly just as to the rules of

\* Or by the half distance, or any other proportion.

SECT. II. the science ; but it may be said, that those rules are violently forced  
 Plate VII. into action, and therefore, the consequent effect is not pleasing, nor  
 strictly just.

*Of Steps parallel to the Picture.*

In Plate XVI. Fig. 2. is an example of the method for determining the representations of steps, when situated parallel to the picture.

The horizontal line is H H, and G G is the base or ground line.

The center of the picture is marked *center*.

The distance is at D P.

The nearest step touches, or is in the plane of the picture ; its width is marked X 2, g, and its height a o ; through which points, the face is drawn geometrically.

At the angle X 2, mark off on the ground line, the measure of the depth or tread of the steps, as from X 2 to d, and from d to e, and also to f.

From X 2, draw a right line to the center of the picture, as the line X 2, N, and from the points d, e, and f, draw lines to the distance of the picture D P.

At the angle X 2 of the step, draw a line perpendicular to the base line, as the line X 2, c, and upon that line, set up the heights of the steps, as many as may be required, as from a to b, to c, from all which points, draw lines to the center of the picture.

Then from the points L, M, N, draw lines perpendicular to the base line, which will intersect the lines that are drawn from a, b, c, to the center of the picture, in the points k, l, m, n, and by their mutual intersections, from the profile of the steps.

Then determine the front and tops of the steps as follows :

At

At each of the points k, p, l, m, n, draw lines parallel to the horizontal line, which lines will express the horizontal angles of the steps.

SECT.  
II.  
Plate  
XVI.

From the point o, the upper and remote angle of the lowest step, draw a line to the center of the picture, as the line o, P, which by its intersection with the line k P, forms the tread or surface of the lowest step; from P, draw another line perpendicular to the horizon, as the line P h, which line, by its intersection with the line q h, will determine the front of the second step.

It is needless to continue the instructions beyond what are already given, as the representations of the other steps are found by a repetition of the same process which produced the first; and a strict examination of the figure, with the application of a ruler from the center, and distance of the picture, to the different points in the object, will clearly demonstrate what is required to complete the figure. Observing, that all the measures for the heights or rise of the steps must be set upwards upon the vertical line X z, c, and their apparent heights determined by lines drawn from those points to the center of the picture, but the breadths or depths of those steps are applied to the base line, as at the points d, e, f, from which lines are drawn to D P, the distance of the picture, which produce the intersections L, M, N, and mark the breadth of the steps.

Another method may be employed to obtain the representation of steps, as shewn in Plate XXVII. which is more elegant and simple than the foregoing, but being more scientific, is given in the fourth Section, see Index.

SECT.  
II.*Of the Representations of Arches parallel to the Picture.*PLATE  
VII.

Examples of two different kinds are given in Plate VII.

Fig. 1, and Fig. 2, are examples of arches which are the segments of a circle.

Fig. 3, is the semicircular arch.

When the arch is a semicircle, the center will be within the limits of the arch or aperture, as in Fig. 3, where the center of the arch X, a, k, is at c 1, in the line X k, which line is the chord of the arch.

But if the arch is the segment or arc of a circle, the center is not confined to the chord of the arch, but may lie out of the tablet or canvas, as in Fig. 1, where the centers for the soffits of the ceiling are low in the plate, as at a 2, b 2.

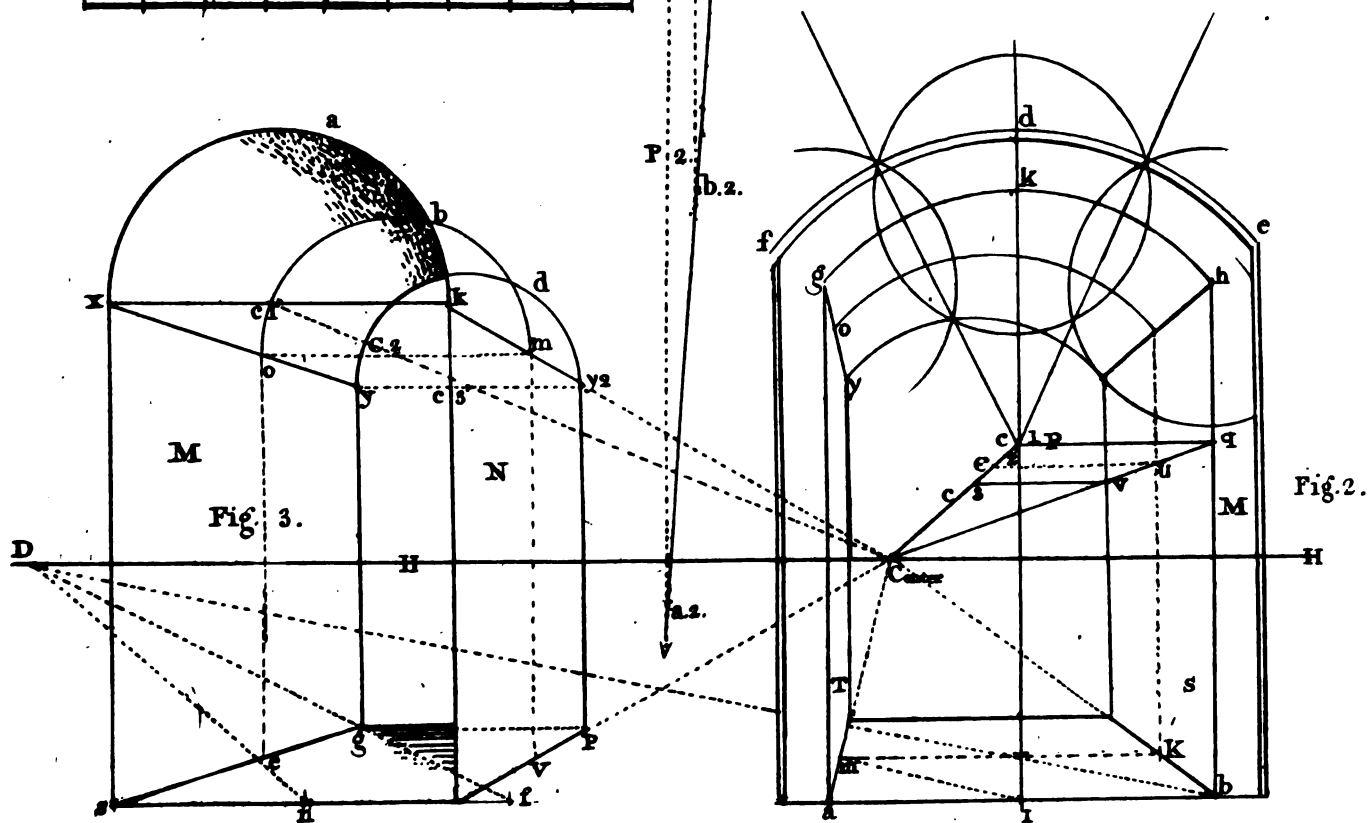
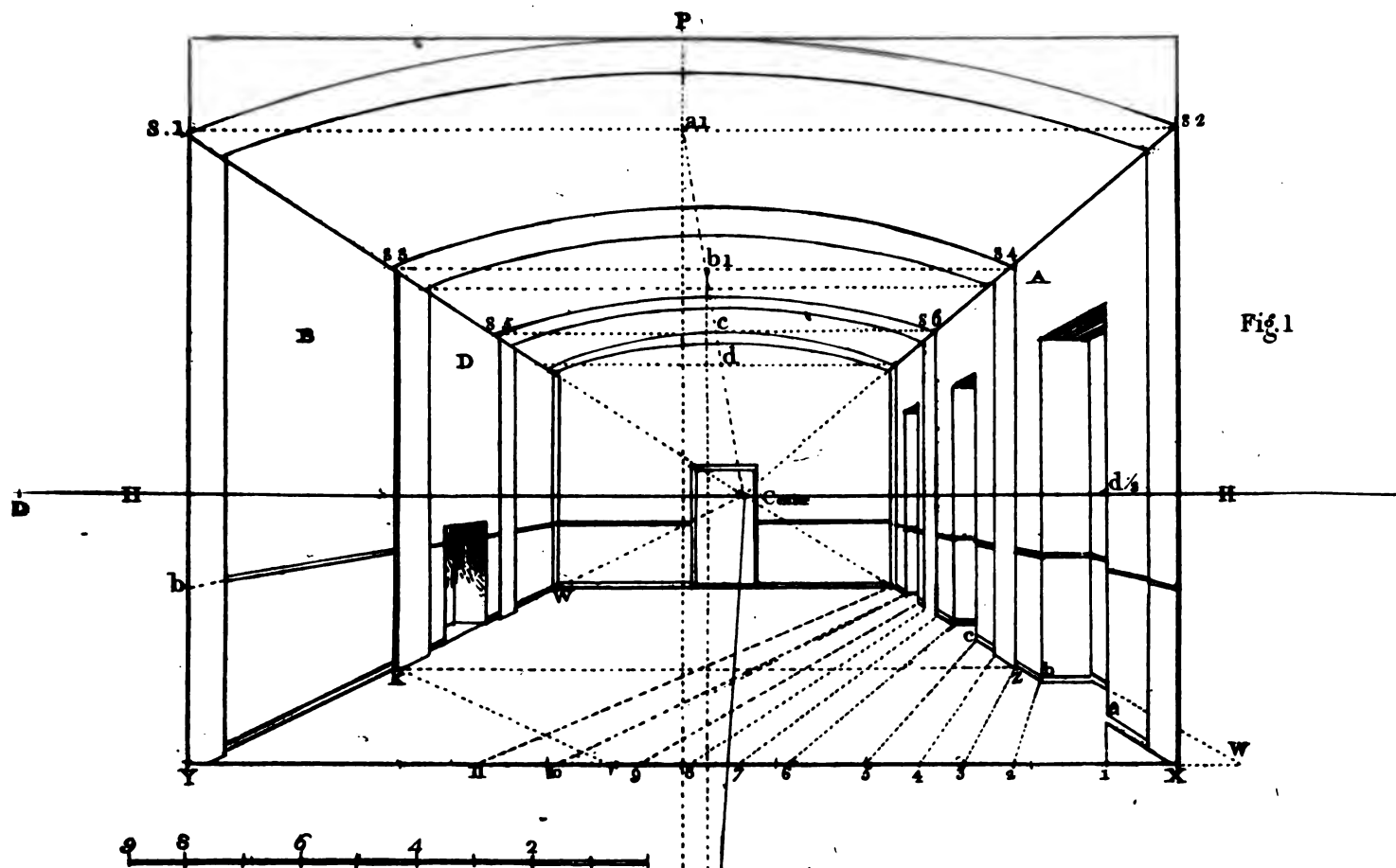
N.B. In Fig. 2 and 3, the center and distance of the picture are the same to both figures. The center is indicated by the word, and the distance is at D, upon the horizontal line H H.

*Process for the Semicircular Arch, Fig. 3.*

Let X k, be the chord of the arch bisected at the point c 1, which will be the center of the arch X, a, k.

Therefore, from the center c 1, of the arch, draw a right line to the center of the picture, upon which line the other centers must be found, by the following process:

Complete the sides of the archway, as M, N, as well that which is not seen, as that which is, and then divide either side of the archway





way perspectively\*, into as many divisions as there are soffits required, as at o, y, and at those divisions draw lines parallel to the horizon, which will intersect the line that is drawn from c 1, to the center of the picture, in the points c 2, and c 3, which, together with the first point c 1, will be the centers for the arch and its soffits. Therefore, with compasses on those centers, describe the semicircles required, as o, b, m; y, d, y 2.

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II.  
Plate VII.

*Of Arches which are the Segments or Arcs of Circles.*

Plate VII. Fig. 2.

Let S and T represent the sides of the aperture, which may be considered as the piers supporting the arch, and let g, h, be the width of the arch, and k, its height.

By Problem the 9th in the geometrical Section, Plate I, Fig. 10, find the center c 1, of an arc, or of a circle, passing through the three given points g, k, h, and with compasses, upon c 1, as a center, describe the arc g, k, h, which will be the representation required.

To find the other centers proceed as follows:

Draw a line from c 1, to the center of the picture.

Then at the point c 1, draw the line P, parallel to the horizon, producing the point q, in the side M, or pier of the aperture, from

\* By dividing a line perspectively, is meant to divide the representation of an original line, that is either perpendicular or inclined to the picture, in a given number of divisions, representing equal parts. As the line s g, is divided into two equal parts respectively, the part e g, representing a part equal s e.

The method of dividing a line perspectively is as follows:

The line s g, Fig. 3, Plate VII. is the representation of a right line perpendicular to the picture. S f is the base line, H is the horizontal line, and D is the point of distance; therefore, upon the base line, set on from the point S to n and f, two parts equal to each other, and to the given measures of the required divisions; then, from the points n and f, draw lines to the point of distance D, and the line S g, will be divided perspectively into portions representing equal parts. The space e g, being the representation of a portion of the line S g, equal to S e.

K 2

which

SECT. II.   
 Plate VII. which point draw a line to the center of the picture, and divide that line perspectively into the same number of divisions, with the required soffits, as at u, v, and then transfer those points by lines drawn parallel to the horizon, producing the points c 2, c 3, by their intersections with the line that is drawn from the points c 1, to the center of the picture; and those points, c 1, c 2, and c 3, will be the centers for the segments which produce the soffits of the ceiling, as g h, and the rest.

In Fig. 1, of the same Plate, the ceiling is the portion or arc of a circle, but being of very faint elevation, the centers for the constructions of the soffits, lie very low on the plate.

To find those centers, proceed as in the foregoing figure. That is, by Problem VIII. Fig. 10, Page 7, in the geometrical Section, find the center a 2, of an arc passing through the points, S 1, P, S 2.

The points S 1, S 2, are the extreme width of the room, and the summits of the nearest pilasters from which the soffits spring; therefore, at those points draw the line a 1, parallel to the horizon, which will be the chord of the arch, bisect this line at a 1, through which point draw the line P, P 2, perpendicular to the horizontal line, and continue it downward as to a 2.

Then from a 1 and a 2, draw right lines to the center of the picture, for the other centers must be found in the line which is drawn from a 2 to the center of the picture.

To obtain the other centers, first find the divisions perspectively on the sides of the room, from which the soffits spring, as the points S 3, S 4, S 5, S 6, and at those divisions draw lines parallel to the horizon, or to the floor of the room; and those lines will cut the line that is drawn from the point a 1, to the center of the picture, and produce the intersections b 1, c, d, from all which points draw right lines perpendicular to the horizon, and where those lines intersect.



fect the line that passes from a 2\* to the center of the picture, will be the centers required for the different soffits.

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Plate IV.

In this figure, no more than two centers are given, which are a 2 and b 2; a 2 is the center for the segment S 1, P, S 2, as already shewn, and b 2, the center for the segment S 3, S 4. The rest of the centers are omitted, because the lines necessary to produce them would incumber the example, but if those which are given are well considered, the student will have no difficulty in finding the rest, only let him remember that every line in the soffit must have its own center.

In Plate IV. Fig. 2, is the representation of a building with semicircular arches, which are drawn by compasses, the centers are found by the process taught in the preceding instructions, given for Fig. 3, Plate VII. page 66.

PLATE  
IV.

The points 4 and 6 being the centers for the front of the soffits, and the points 5 and 7, the centers for the back line of the soffits of the arches.

Plate VIII. Fig. 1.

*Which is drawn to a Scale of One Inch to a Foot*

Represents a stool situated parallel to the picture. The dimensions of which are as follows †:

PLATE  
VIII.

The height is 1 foot 9 inches.

The width is 1 foot 6 inches.

\* The line which is drawn from a 2 to the center of the picture, is the indefinite representation of the line in which the centers for all the soffits are found, for it may be considered as the axis of the concave cylinder, of which the ceiling is a part.

† The scale is not marked on the plate, therefore the student may exercise himself, by taking the proper measures from any common rule.

The

SECT.  
II.  
Plate  
VIII.

The depth is 1 foot 1  $\frac{1}{2}$  inch. -

The upper rail is 2  $\frac{1}{2}$  inches broad.

The legs are 1  $\frac{1}{2}$  inches thick.

The lower rail is 4  $\frac{1}{2}$  inches from the ground.

And - - - - - 1  $\frac{1}{2}$  inch broad.

Its distance beyond the picture is 1 foot 6 inches.

The height of the eye is 5 feet.

H is the horizontal line.

C is the center of the picture.

And D is the distance, which is 5 feet 3 inches.

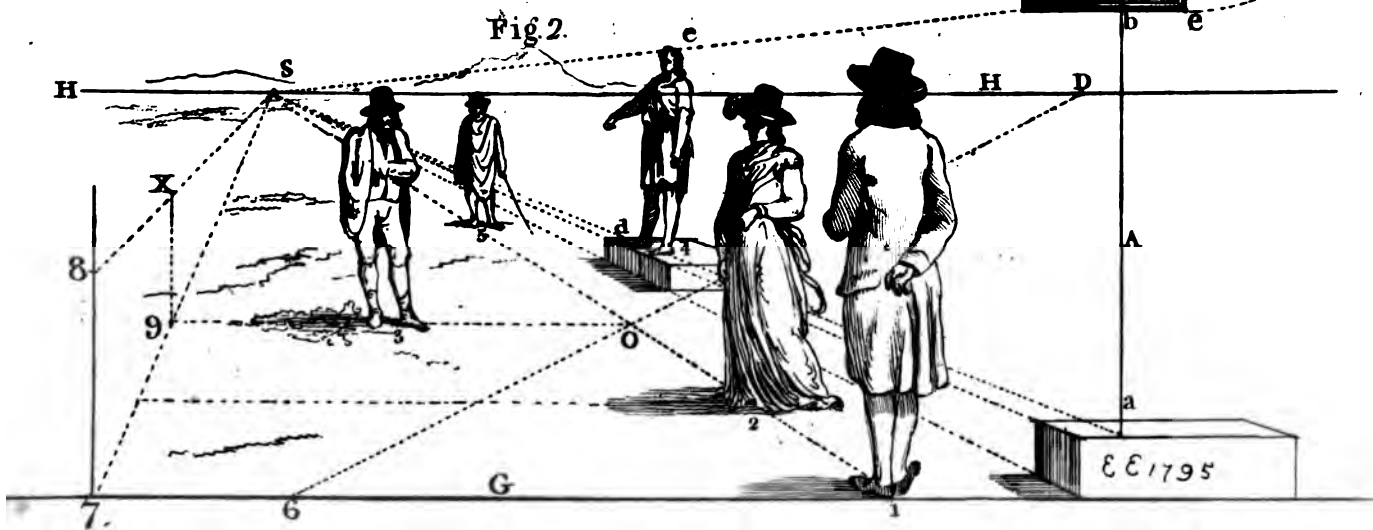
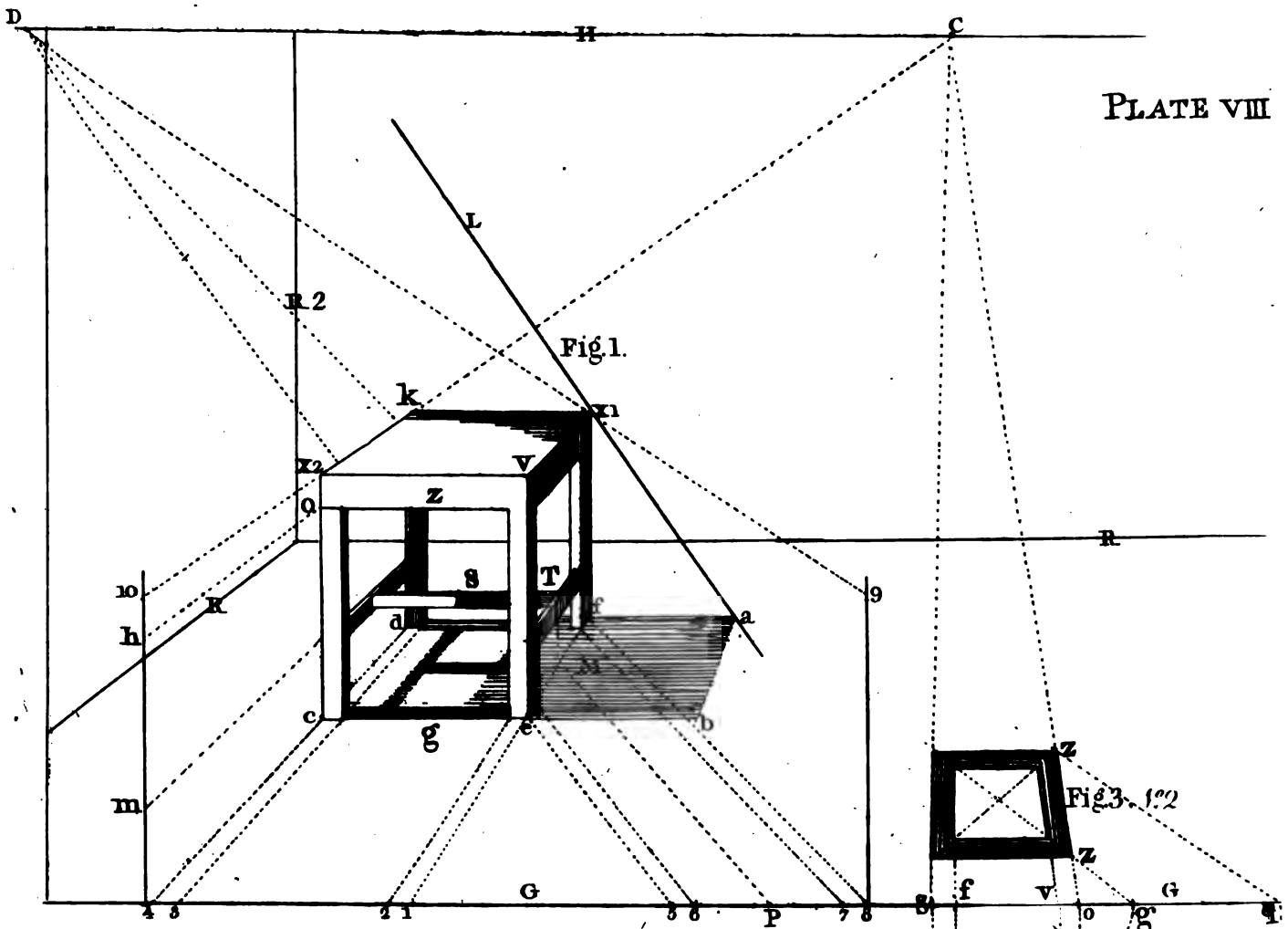
\* Having determined the seat of the nearest leg on the base line G, as at 1, set on the whole width of the front of the stool, that is 1 foot 6 inches by the scale, from 1 to the point 4. Then determine the distance at which the stool is placed beyond the picture, which is 1 foot 6 inches; thus from the point 1, set off that distance by the scale to the point 5. Then, from 5, set off the depth of the stool, 1 foot 2 inches, to 8. Having thus determined the measures of what may be called the plan of the stool, draw right lines from the points 1 and 4 to C, the center of the picture, and from 5 and 8, draw lines to D, the distance of the picture, and those points in which the lines that are drawn from 5 and 8 to D, cut or intersect the line which is drawn from the point 1 to the center C, will mark the space that lies between the picture and the object, and also the depth of the object.

Thus the space between the points 1 and e, represents the distance

\* The stool is disposed as if standing in a room, of which a part only is seen. The lines R R, are the interfections of the floor with the sides of the room, and the line R 2, is the interfection of two of the sides which are seen.

Fig. 3. No. 2. is the representation of a square on the same floor, on which the stool stands, therefore the center and distance of the picture are the same with those by which the stool is drawn.—See the explanation in Section VI. Page 245.

between





between the picture and the stool, and the space from e to f, is the depth of the stool.

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II.  
Plate  
VIII.

Complete the plan of the object, by drawing lines parallel to the horizon, or to the base line, from e to c, and from f to d, then will the line c e, express the apparent width of the front, and e f, the depth of the side.

Then find the height of the stool as follows:

At the point 4 in the base line, draw the line 4, 10, perpendicular to the ground line; and upon that line, set up the height of the stool, from 4 to 10, which is 21 inches by the scale; and from the point 10, draw a line to the center of the picture C.

Then from the point c, in the base or plan of the stool, draw the perpendicular line c, X 2, till it cut the line which is drawn from 10 to C, and the line c, X 2, will be the apparent height of the object, for it is the outer angle of the nearest legs.

Complete the general form of the stool by the following method:

From the point V, draw a line to the center of the picture C, and the mutual interfections of those lines will produce the general outline of the stool.

Then at the points f, d, draw lines *perpendicular* to the horizontal line, and at the points X 2 and X 1, draw lines *parallel* to the horizontal line, as the lines X 2, V, and X 1 k.

Thus far it is evident, that the process is the same with that which was employed for the simple form of a block, whose sides are at right angles with each other, and front parallel to the picture.

There remains to find the thickness of the legs, and the proportions, and places, of the rails.

For the thickness of the legs in *front*, take the given dimensions, 1  $\frac{1}{4}$  inch, from the scale by the compasses, and set that measure upon the base line from 1 to 2, and from 4 to 3; and from those points

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Plate  
VIII.

points draw right lines to the center of the picture C, and those lines will mark the apparent thickness, by their intersection with the line c, e.

Then for the thickness of the legs on the *sides* of the stool, apply the same measures in the same manner, upon the base line, from 5 to 6, and from 8 to 7, and from those points draw lines to the *distance* of the picture D, and the intersections of those lines with the line that is drawn from 1 to C, will give the apparent width required.

Having found the widths of the two legs e and f, the others are obtained of course, by drawing lines parallel to the base line from one side to the other.

Find the depth of the upper rail Z as follows: Upon the line 4, 10; mark the dimensions of its depth,  $2 \frac{1}{2}$  inches, which must be set *downwards* from 10 to h, from which point draw a right line to C, and the intersection of that line, with the angle of the stool, will give the apparent depth of the top rail, as at o.

The same method must be employed to determine the place and dimensions of the lower side-rails, the upper lines of which are marked at m, upon the line 4, 10, and then transferred to the stool by lines drawn from that point to the center of the picture C.

The place of the stretcher S, which passes from rail to rail, is in the middle of the *sides* of the stool. Therefore to find its place divide the space between 5 and 8 (in the base line) in two equal parts, as at P, and from P draw a line to the *distance* of the picture D, and the intersection of that line with the line which is drawn from 1 to the center of the picture, as at M, will give its *seat* on the *floor*, or base of the stool; therefore, transfer that point to the side rail by a line drawn perpendicular to the floor, which will give the intersection T, the place of the stretcher.

By duly confidering this figure, together with the explanation, it will be evident that the principles are extremely fimple, and the procefs uniform, for obtaining the true representations of the different parts of any object, in proportion to their juft dimenfions : confequently, if the method employed for finding the representation of the upper rail o, X 2, is well underftood, the ftudent will readily perceive that a repetition of the fame procefs will determine all the other fmall parts.

SECT.  
II.  
Plate  
VIII.

More lines might have been employed, fuch as thofe for obtaining the thicknefs of the fide rails ; but they are omitted, that the figure might not be too much confufed \*.

In Plate VIII. Fig. 2, is alfo given an example for determining the heights and ftations of figures, when fuch are required in a landscape, or view of a building.

What has already been obferved in the courfe of this work muft be here repeated, namely, that the horizontal line is always drawn upon the picture, at the fame height above the bafe line, that the eye of the fpectator is known or fupposed to be above the ground or plane of the view ; therefore, if the fpectator ftand upon the fame floor or plane with the perfons that are to be *reprefented*, then the horizontal line will pafs through the eyes of all thofe figures, provided they were all of equal heights with each other, and of the fame ftature with the fpectator ; but as this can rarely happen in nature, fo in the example they are of different heights, yet all of them have their heads nearly equal to the horizontal line.

Let it be fupposed, that G is the ground line, or bafe line of the

\* In this example, the line L, a, relates to the fhadows, and is explained under that Section.

The ufe of the vertical line 8, 9, is explained in Sect. III. Page 118.

L

picture,

SECT.  
II.  
Plate  
VIII.

picture, and H H the horizontal line; and that the \*figure which stands on the point 1, is of the same stature with the spectator; then the horizontal line will pass through the eye of that figure, as in the example.

To find the proportionate heights of the other figures which are on the same plane, from any point in the horizontal line, draw a right line to the base line, as from S to 1; and any space taken between the line S 1, and the horizontal line H, will give the apparent height of a figure, in proportion to its distance, as at 2, 0, 5; observing, that those figures not being supposed so tall as that which is standing at 1, their heads are rather below the horizon.

If it be required to determine the height of any figure at a given distance from the picture, proceed as follows:

At the point 1, which is the seat of the principal figure, set off on the base line the known distance of such figure, as from 1 to 6; and having marked the distance of the picture from S to D, on the horizontal line, draw a line from 6 to D, and it will intersect the line which is drawn from 1 to S, at the point O; therefore, the space between the point O and the horizontal line, will be the general height of every figure equally distant beyond the picture.

If it be necessary to transfer that height to some other part, *equally distant* from the picture, draw a right line, as from O, parallel to the ground line, as O, 3 to 9; and that line will determine the seat of all the figures which shall range parallel to the picture, at the same distance from it with the point O.

Should the figure be required to appear as standing upon a step, proceed as follows: Upon the ground line set up, from the seat of the figure, the height of the step, and above that add the height of the

\* The back figure 1, is placed upon the ground line, which is done to shew where the measure must be placed on the picture; but in finished works it would be improper to place any figure on that station; the nearest should stand somewhat beyond the picture.

figure,



figure, as at a, A, b; and from the step a, and the upper point b, draw lines to S; and these lines will determine the heights of all figures, that may be required as standing upon steps of equal height with the first; the lower lines will determine the height of the step, and the upper line the height of the figure.

SECT.  
II.  
Plate  
VIII.

When the spectator is supposed to stand upon an elevation, above the plane on which the figures are standing, the process will be the same, though the appearance will differ, for the heads of the figures will then be below the horizontal line, in the same proportion as the horizon is above the general height of their eye. Thus, supposing the height of the horizon H H, twelve feet, then will the nearest figure appear about half the height of the horizon, allowing such figure to be six feet high.

To find the heights of figures, when the horizon is elevated, proceed as follows:

Suppose the horizon to be  $10\frac{1}{2}$  feet high, corresponding with the eye of the spectator, and the figure to be six feet high.

Let the line 7, 8, Fig. 2, represent the height of the figure, H the horizontal line, and S the center of the picture. Draw lines from the points 7 and 8 to the point S, and any space taken between those lines, will give the height required; as from 9 to X, will be the height for any figure placed at that distance beyond the picture at the point 9.

Any two points taken at pleasure in the horizontal line, if considered as center and distance, will give both the proportion and place of the figure, provided those points are distant from each other in the same ratio with the distance of the picture; for nothing more is to be obtained than a single vertical line, that \* shall mark the height and station of the figure, after which the rest must be drawn by the hand.

\* This example fully explains the process, by which the historical painter should proportion his figures to each other; but of this more will be said in the discourse which is subjoined.

## SECT.

II.

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VIII.

It must be observed, that in all the examples of this work, in which figures are introduced, the horizontal line passes either through, or just above the heads, of those figures; because they are intended to represent adults nearly of the same stature with the spectator, who views them, standing upon the same plane with the figures.

PLATE  
IV.

In Plate IV. Fig. 1, there are two figures, one taller than the other; the head of the taller rises a little above the horizontal line, the shorter is considerably below: therefore the taller may be considered as above six feet high, and the lowest five; or it may be supposed the representation of a younger person.

*Of Mouldings parallel and perpendicular to the Picture.*

PLATE  
IX.

As many of the lessons in this work are composed of architectural forms, it is necessary to observe, that the student who is unacquainted with the principles of architecture, will labour to no purpose if he attempt to delineate such objects\*, unless he first acquire some knowledge of that science. But the limits of this work will not admit of introducing a series of instruction for the use of such: yet some hints are absolutely necessary, particularly in the article of mouldings, because their true representation in perspective cannot be obtained without a correct knowledge of their construction. The student must therefore endeavour to understand perfectly the following explanation:

When mouldings, placed on any flat surface or plane, are united or joined to mouldings, which are disposed upon another flat surface or plane, the joint of those mouldings is called the mitre; and such joint, or mitre, always bisects or equally divides the angle, which the planes make at their intersection with each other; hence it follows,

\* See similar observations in the elder Malton's Treatise, Vol. I. page 172, first edition.

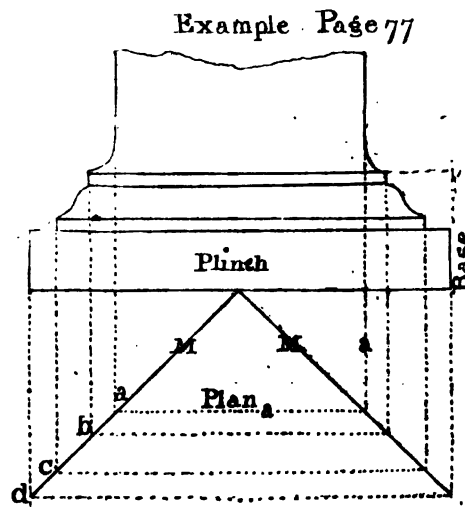
that

that every mitre line of a square, or right angular block, makes an angle of 45 degrees with either of the sides of the block.

When the object is a square, or regular polygon, the mitre line will not only bisect the angle, but it will also pass through the center of the square or polygon; but if the figure be a parallelogram, or irregular polygon, the mitre will only bisect the angle, but will not pass through the center of the figure.

It is necessary to attend particularly to the foregoing circumstances, because the mitre line may be found without its vanishing point, in the representation of a square, or of a polygon when regular; but when irregular, then the vanishing point of the diagonal must be found and employed.

The better to explain the foregoing instructions, let the under figure be considered as representing the geometrical elevation of the base of a pedestal, together with its plan; the mouldings of which are the same with the base B, Plate IX. Fig. 1, but of smaller dimensions.



Below

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II.

Plate,  
Page 77.

Below the geometrical base is half its plan, in which the lines a, a, a, express the dado. The lines b, c, d, are the extreme projections of the mouldings, which are carried round the dado, and form the base. The mitre lines of two of the angles are marked M M, upon which lines, the mouldings are united or joined together; therefore, in the perspective representation, it is necessary that those mitre lines should be drawn *perspectively*, before the representations of the members or mouldings can be determined.

When mouldings are to be drawn in perspective, their geometrical profiles must be first drawn by the scale to the size required; which may be done in a detached part of the drawing, as in Plate IX. Fig. 2, or upon a separate paper.

When they are disposed parallel and perpendicular to the picture, the simple profiles, drawn upon their place, is a sufficient guide by which to form their representations; but if they are inclined to the picture, it will then be necessary to draw the profile with the mitre line of one angle, as will be shewn in the next section.

As a preparatory lesson to the delineation of mouldings, it will be necessary, first to consider the manner of representing a plain projecting fascia, or plat-band; which being mitred at the angles, exhibits the rudiments of mouldings.

PLATE  
IX.

In Plate IX. Fig. 3, is an example for delineating a projecting fascia, or plat-band, round any pedestal or building whose sides are at right angles with each other, and whose front is parallel to the picture.

Let it be supposed, that the square block or cube A is already drawn, and that it is required to describe the projecting fascia B, surrounding the upper part.

The horizontal line is marked H H.

C is the center, and D the distance of the picture.



The

The upper angles of the cube are e, g, o: therefore, from the points e g, set downwards the dimensions or thickness of the fascia, as from e to i, and from g to k.

SECT.  
II.  
Plate IX.

Then draw the geometrical form or profile of the fascia, at either of the front angles, as at e, i, s, V, or g, k, s, V 2, on the contrary side.

Then determine the perspective appearances of the squares e, g, h, o, and i, k, l, m, \* one above, answering to the upper surface of the block; the other below, corresponding with the thickness of the fascia, as if the object were transparent; by which supposition the points e, g, h, o, i, k, l, m, will express the angles upon the block, of the thickness of the plat-band, or fascia.

Through the points e, g, h, o, and i, k, l, m, draw the diagonals, continuing them beyond the angles of the cube, as the lines e, h, i, l, and k, m.

Then, through the points S and V, which are the geometrical projections of the profile of the fascia, draw lines from the center of the picture C, which may intersect or cut the diagonal lines e h, and i l, in the points X, X 1; which points will be the mitre angles of the *perspective* projection required; from those points draw the lines w 1, w 2, parallel to the horizon; and those lines will produce the representation of the front of the fascia.

The length of the side of the fascia is also determined at P, by the intersection of the diagonal, m K, with the line drawn from the center of the picture C to X 1.

It must be observed, that in this example the fascia is to be considered as projecting forwards before the picture, seeing that the front of the cube or building, as a, b, g, e, is in the plane of the picture. Yet the operation would be the same, if the building were placed beyond the picture; nothing more being required, than to proportion

\* It is needless to observe, that the representation of these squares, must be obtained by the rules already taught in the first lesson of this section.

SECT. II. the dimensions of the fascia to the size of the building, and then to proceed as before.  
 Plate IX.

All objects that are square, when their sides are parallel and perpendicular to the picture, have their diagonals vanishing in the points of distance; consequently, those diagonals can be obtained by drawing lines through the angles from the points of distance, as the line through e and i, from the point of distance D, or through g and k, from the other point of distance, provided it were in the paper or tablet: but, as it will often happen that one of these points cannot be introduced, as is the case in this example; it will then be the best method to employ the process here given, which is, first to form the square of the dado, as if transparent, and then to draw the diagonals through the angles of that square, without regard to the points of distance.

*Pedestal with Base and Cornice.*

Plate IX. Fig. 1, is an example of a pedestal with a base and cornice, whose sides are parallel, and perpendicular to the picture.

G is the ground line or base line.

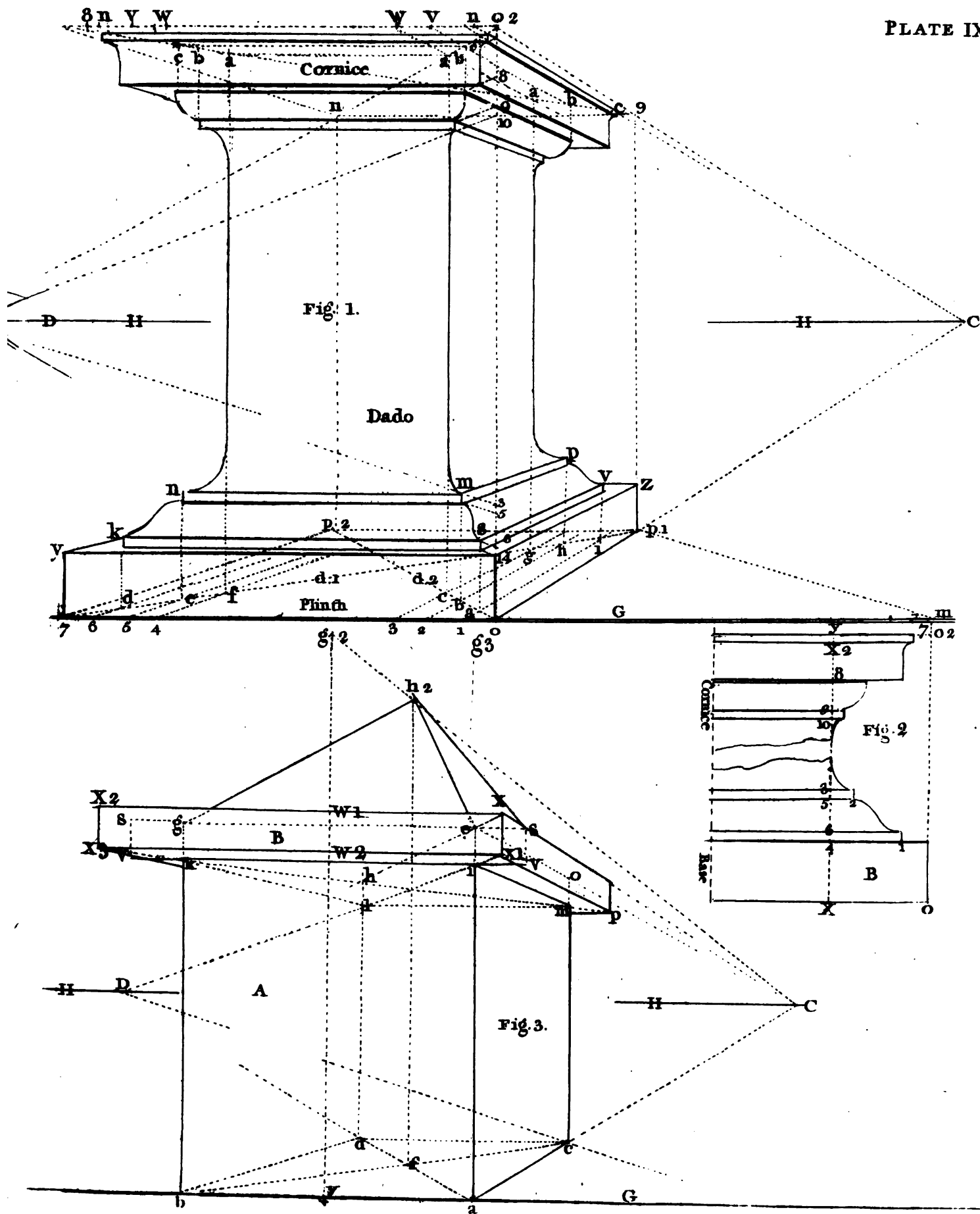
H is the horizontal line.

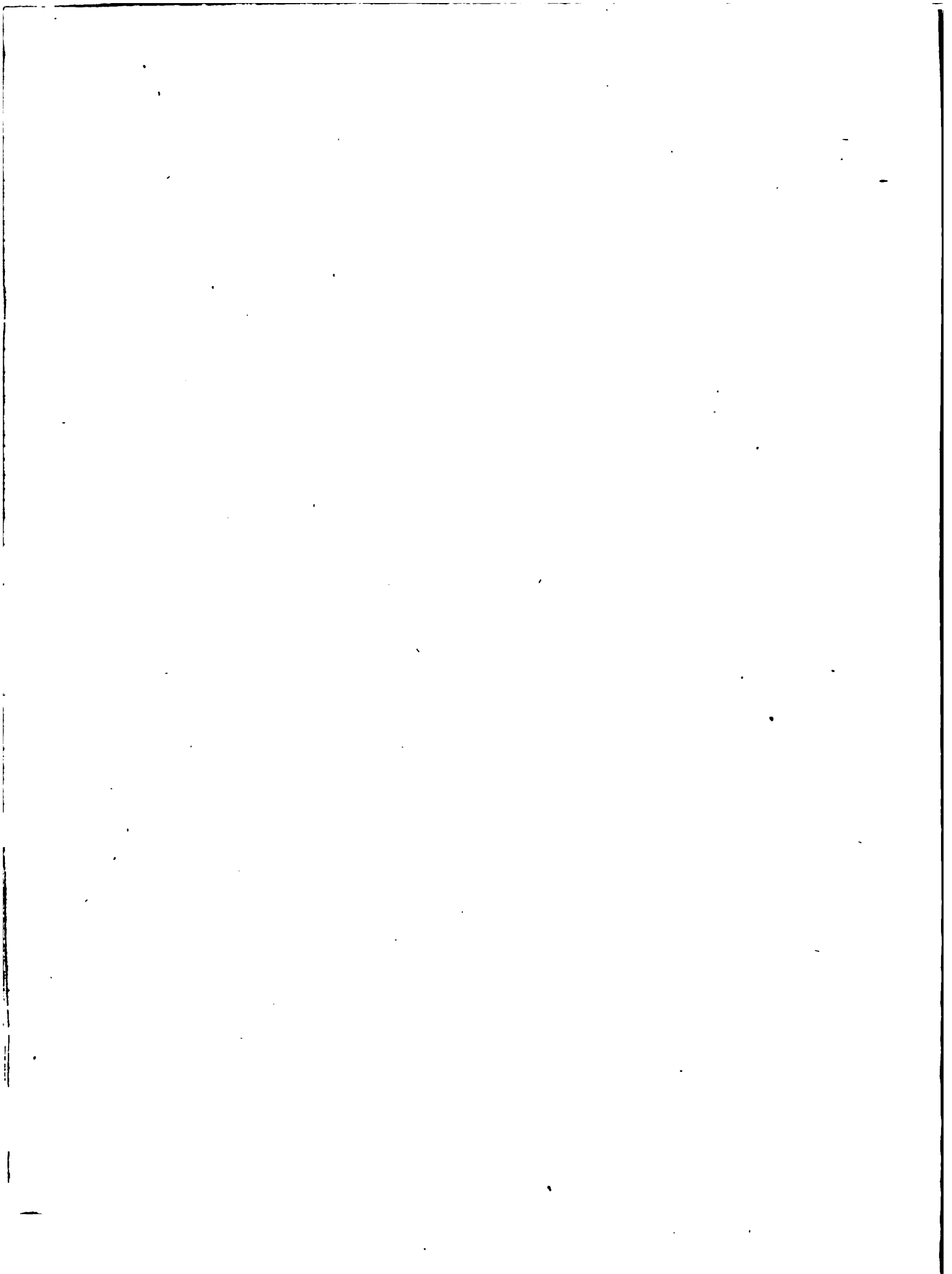
C is the center of the picture, and D indicates the distance, which in this example is out of the plate.

Upon any separate paper, or upon some remote part of the drawing, describe the geometrical profile of the mouldings, at their given size, as at Fig. 2, together with the line X X 2, which is the angle of the dado.

Upon the ground line G, Fig. 1, determine the perspective appearance of the square of the whole base, as the lines o 7, p 1, p 2.

Then from the points o 7, p 1, draw lines perpendicular to the horizon, and determine the general form, which may be supposed to contain







contain the whole of the pedestal, with all its mouldings, as the lines o, o 2, 7, 8, P 1, P 2, 11.

SECT.  
II.  
Plate IX.

From the point o, draw a line to P 2, and from 7 draw a line to P 1, which lines will be the diagonals of the base: they are marked d 1, d 2.

Upon the line o, o 2, set up the height of the plinth from o to 14, equal the height from X to 4, in Fig. 2, and complete the perspective representation of the plinth marked 14, y, Z.

Then from the point o, set upon the ground line the space o 3, equal to X O, in the base of the geometrical profile Fig. 2; repeat the same on the other side from 7 to 4: then will the space between 4 and 3 be equal to the given or supposed breadth of the dado: and the spaces from o to 3, and from 4 to 7, will be equal to the projections of all the members of the base beyond the dado.

Between o and 3, in the base line of Fig. 1, set off the divisions 1, 2, 3, equal to the projection of each of the members of the base, as given in the geometrical profile Fig. 2, as from 4 to 1, and from 5 to 2, which is 3 to 1, and 3 to 2, in Fig. 1; repeat the same at the other angle, as from 4 to 6, and from 4 to 5.

From the points 1, 2, 3, and 4, 5, 6, Fig. 1, draw right lines to the center of the picture C, and they will intersect the diagonal lines d 1, d 2, in the points a, b, c, and d, e, f, and also at g, h, i; which points are the seats upon the *ground* of the projections of the mouldings of the base at their angles.

Then upon the vertical line o, o 2 Fig. 1, set up the heights of the mouldings, equal the heights of the members in the geometrical base Fig. 2, as from o to 14, Fig. 1, equal to X 4 in Fig. 2, and from 14 to 6, to 5, to 9, equal the same figures in the geometrical profile Fig. 2.

From those points draw right lines to the distance of the picture D,

M

and

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II.  
Plate IX.

and from the points \* a, b, c, in the diagonal d 2, draw lines perpendicular to the horizon; and the intersections of those lines with the former will determine the perspective projections of the mouldings, as at S, m, k, n, whose forms or profiles must be drawn by hand where they are curved, where straight, by the ruler. The same process must be repeated at the other angles, observing, that to complete the forms of the mouldings, right lines must be drawn from those points parallel to the horizon, and also from the same points to the center of the picture C: the former will produce the representations of the front mouldings, as the lines m, n, k, s; the latter those of the sides m P, and S V.

#### *Cornice of Pedestal.*

For the upper mouldings, or cornice of the pedestal, proceed as follows :

First, let it be observed, that the plinth projects beyond the cornice in Fig. 2, as much as from o 2, to n. Therefore, from the angle o 2, Fig. 1, set off the space to W, equal o 2, Y, in the geometrical profile Fig. 2; then is W the feat of the upper angle x of the dado, or shaft of the pedestal, upon the picture.

Then from W, Fig. 1. set on towards o 2, the projections of all the mouldings of the cornice, equal to the projections of the same members in the profile, Fig. 2, as n, v; repeat the same at the angle 8; and from those points draw lines to the center of the picture C, which will intersect the diagonals of the top in the points a, b, c.

At the angle o 2, Fig. 1, set downwards upon the line o 2, o, the heights of the mouldings, equal the measures from Y to 8, 9, 10, in the profile of the cornice, Fig. 2, as at 8, 9, 10, in Fig. 1, and as was

\* The student must observe, that the letters of reference are the same on both sides of the pedestal upon the diagonals; therefore the left side of the print will more clearly explain the right side.

done

done in the base; draw lines from those points to the distance of the picture D.

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II.  
Plate IX.

Then from the points a, b, c, in the diagonal lines, draw lines perpendicular to the horizon, that may intersect the lines which are drawn from the points 8, 9, 10, to the distance of the picture D; \* and their mutual intersections will give the angular terminations of the mouldings, from which lines must be drawn horizontally to express the front mouldings, and from the same points to the center of the picture for those which express the mouldings of the side; and the form or perspective appearance of the angles of the members must be drawn by the hand, as in the mouldings of the base.

In the example, Plate IX. Fig. 1, the mouldings do not project before the picture; on the contrary, the plinth touches it; consequently, the other members are beyond the picture.

It must be observed, that the mouldings in the example Fig. 1, appear exaggerated, which effect follows from the profile having too great projection in the geometrical construction; but this was done that the example might be more explicit.

When it is required to represent mouldings round any building whose sides are parallel, and perpendicular to the picture, it will be sufficient, in most cases, to sketch the geometrical profile upon the part where such decorations are to be placed, marking the members by a general proportion to the height of the pedestal, or building, then by the mitre lines adjusting the perspective appearance of the profile, as directed in the foregoing examples.

Let it be particularly noticed, that in all positions of mouldings, whether parallel to the picture or inclined, it is the mitre lines that must determine the true representations of their projections.

\* The reader will observe, that, to avoid confusion, all the points are not distinguished by marks or initials; yet the whole will be easily understood by tracing the example, which, if attentively examined, will explain as much as words.

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II.

Plate X.

*Of Mouldings, with their Returns at the Angles of Planes or Walls, which are disposed parallel, and perpendicular to the Picture.*

Example, Plate X. Fig. 1.

The planes A and E are parallel, while those marked B and F are perpendicular to the picture. They represent four walls, at right angles with each other, surmounted by a cornice, having the returns of the mouldings agreeably to the plan, Fig. 4. which is half the size of Fig. 1.

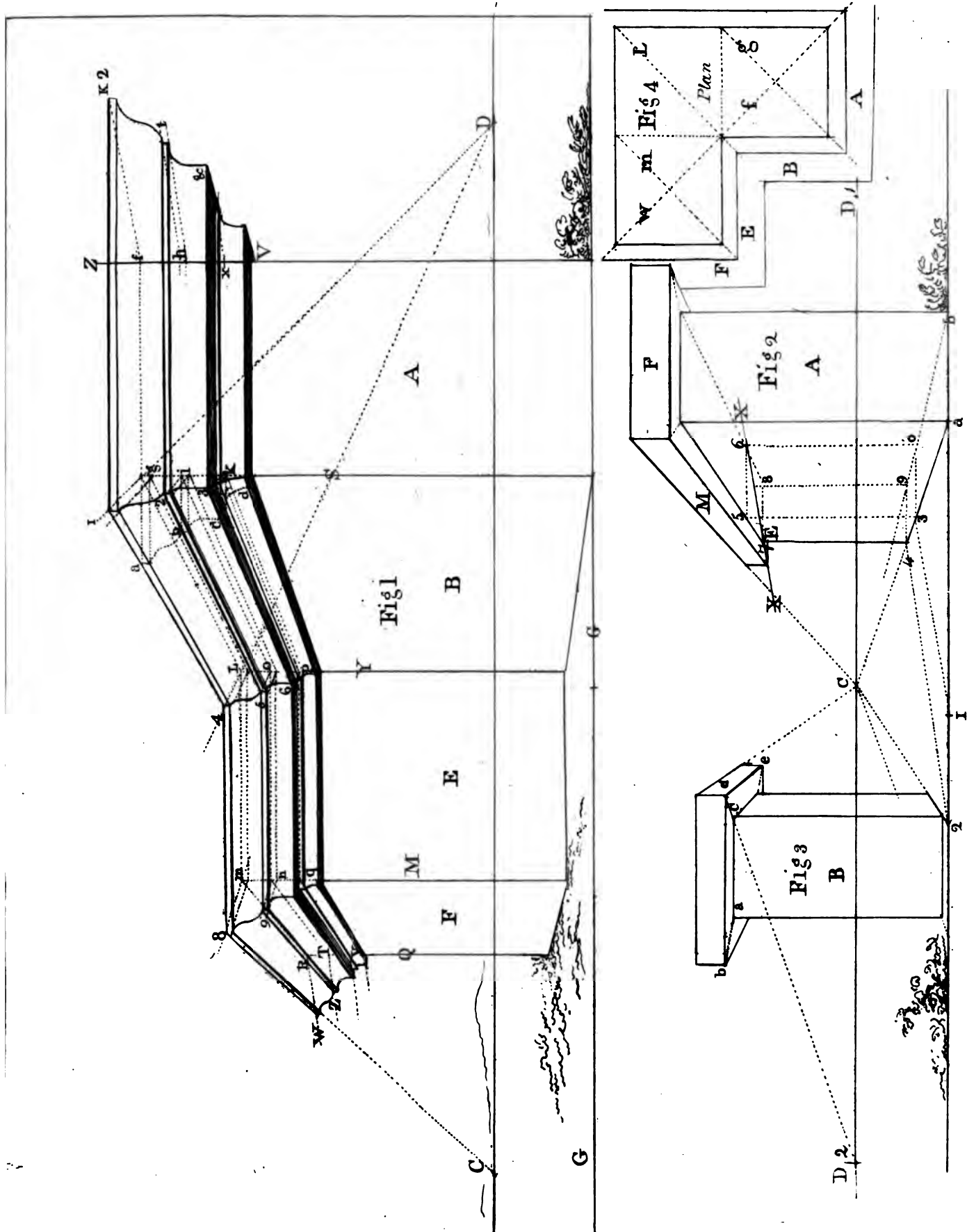
The line D C is the horizontal line, C is the center of the picture, and D is the distance.

First determine the perspective appearance of the form of the building, by the rules already given in the preceding part of this Section; and having found the different angles marked by the letters f, g, L, m, and R, proceed as follows :

The plane or wall which is nearest to the spectator is A, consequently the nearest angle is g, k, S; therefore, upon that angle, draw the geometrical profile of the mouldings or cornice a, b, c, d; and let the points g, i, k, be considered as the mitre points of the mouldings upon the angle of the walls A and B, for those points are the seats of the lines which form the different members upon that angle.

Through the points g, i, k, draw right lines to the center of the picture C, which lines will intersect the line Y L, the inner angle of the planes B and E, in the points L, o, p, which will be the points for the mitres of the mouldings, at the interior angle L Y of the planes or walls B, E; for the lines which are drawn from the nearest angle g, k, of the building, to C, transfer the geometrical heights of the mouldings from the line g, i, S, to the line L Y.

Then





Then through the points g, i, k, on the nearest *exterior* angle, and also through the points L, o, p, in the nearest *interior* angle, draw lines from the point of distance D, as D g 1, in the *exterior* angle, and D L 4 in the *interior* angle; repeating the same process through the points i, k, o, P; and those lines will be the mitre lines for the different members of the cornice, upon the planes A and B.

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II.  
Plate X.

Then determine the *perspective* appearance of the mouldings, by drawing lines from the center of the picture C, through the points a, b, c, of the geometrical profile, till they cut the mitre lines of both angles, as the lines C a 1, C b 2, and C c 3, which lines form the representations of the *Cima Recta* and *Corona* of the cornice, upon the plane or wall B.

The front Z of the cornice must then be obtained by the following method :

The vertical line V f is the outer angle of the plane A, and the points f, h, x, V, are the mitre points for the mouldings upon the angle V f. Those points are found by continuing the lines of the geometrical profile of the cornice to that angle, as marked in the example; therefore, through the points f, x, h, draw lines from the contrary point of distance to that which was before employed, as the lines f, K 2, and h, t, and also through the points x and V, which lines will determine the projection of the members of the cornice upon the angle V.

Then from the points 1, 2, 3, and the other points of the perspective profile, draw lines parallel to the horizontal line, as the lines 1 K 2, 2 t, 3 O, and also from the lower points.

Then find the representations of the mouldings upon the plane or wall E, as follows :

From the points L, o, p, which are the seats of the mouldings upon the line Y L, draw lines parallel to the horizontal line, which lines must

SECT. II. must intersect the line M m, as the lines L m, n o, and p q; and the  
 Plate X. points of intersection m, n, q, will be the seats of the mouldings on the exterior angle M m of the plane or wall E.

Through the points m, n, q, draw right lines from the distance of the picture D, as the lines m s, n g, and so on of the rest; and those lines will be the mitre lines for the mouldings upon the outer angle M of the plane or wall E.

Then from the points 4, 5, and 6, which points are the extreme projections of the perspective profile of the mouldings in the inner angle, draw lines parallel to the horizontal line; and the intersection of those lines with the mitre lines, as m s, and the other lines, will determine the perspective projection of the mouldings upon the angle M.

To complete the farther angle Q R, find the seats of the mitre points upon the line Q R; which is done by drawing lines from the points m, n, and q, to the center of the picture C, which lines will intersect the line Q R in the points R T, and y; through which points draw lines from the contrary point of distance\* to that which was before employed, and those lines will be the mitre lines for the termination of the remote angle Q R.

Then from the points s g, and also from the other points in the perspective profile of the mouldings on the angle M m, draw lines to the center of the picture C, which lines will express the upper and lower fillets of the *Cima Retta*, and their intersections with the mitre lines at W and Z, will mark the projection of the mouldings upon the outer angle, the curved profiles of which must be drawn by hand, as must all the profiles of the other angles.

\* Observe, that this point of distance is not in the plate, for want of room.

The



The whole of the foregoing process consists in first finding the geometrical feats of the mouldings upon the nearest angle of the building, as the points g, i, k, upon the line S, are the feats of the mouldings upon that angle;

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II.  
Plate X.

Secondly, transferring those points or feats to the other angles of the building, as to the angle Y L;

Thirdly, through those feats drawing the diagonal lines for the mitres or joints of the mouldings, as the lines D g 1, and D i 2, in the nearest exterior angle S, and also the mitre lines D L 4, and D o 5, in the interior angle Y;

Fourthly, determining the perspective representation of the horizontal divisions of the mouldings, by drawing right lines from the center of the picture C, through the angles a, b, c, of the geometrical profile, till they intersect the diagonal or mitre lines, as the line 4 a, which is drawn from the point C through a, and cuts the diagonal, or mitre line D g, in the point 1; which line forms the upper line of the *Regula*, marked 1 4, above the *Cima Recta*, and, by its intersection with the diagonal D L, determines, at the point 4, the return for the similar member marked 4 8, which surmounts the cornice upon the plane or face E.

The foregoing will be still better understood, by considering the plan, Fig. 4, in the same plate, which is half the dimensions of Fig. 1. The sides A, B, E, F, of the plan, corresponding with the same marks in the sides of the elevation, Fig. 1.

The diagonals g, L, m, in the plan, correspond with those in the elevation marked with the same characters, as do those marked W f.

Observe, that the three diagonals, or mitre lines, g, L, m, are parallel to each other; therefore their representations require the same vanishing point, which in Fig. 1. is D, the point of distance.

The

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II.  
Plate X.

The other diagonal *W* intersects the former at right angles, and, therefore, the representation requires the contrary point of distance for its vanishing point; but this point is not in the example, for want of room. Could it be introduced, its place would be upon the horizontal line, equally distant from *C*, upon the left side, that the point *D* is on the right.

It is to be observed, that the angle *V Z*, of the cornice appears distorted in the representation, although perfectly true in construction; this unpleasing effect is produced by the disposition of the object, which is so placed, that the plane *A* is in the plane of the picture; consequently it follows, that all the mouldings upon that plane project forward, before the picture, and produce this disagreeable effect.

In Plate X. Fig. 2, is an example for drawing diagonals or mitre lines, for the construction of mouldings, when\* more than one point of distance cannot be applied upon the plane of the picture.

Let *A* represent a solid pier, to which it is required to find the mitre lines, or diagonals for the construction of mouldings at the farthest angle *E*; the canvas or paper being too short to admit of the distance *D 2*, which, if obtained, would be the vanishing point for the mitre lines of the angle *E*.

Having drawn the pier *A, E*, whose plan or base is a parallelogram,

\* To prevent misapprehensions it should be observed, that as there can never be more than one point of sight, so there can never be more than one distance of the picture. Yet, for the facility of operation, this point may have many representations; it commonly has two, which are placed upon the horizontal line, one on each side of the center of the picture, and at equal distances from it, as *D 1* and *D 2*, are both the representations of one point of distance, being equally distant from the center of the picture *C*, Fig. 2. and Fig. 3. This is the general practice, when the objects to be drawn have their sides parallel, and perpendicular to the picture; but in the oblique positions, the distance of the picture is applied in as many different places as may be required, which will be shewn in the next section.

Let the farthest part of the perspective plan be resolved into a square, by the following process:

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II.  
Plate X.

The thickness of the pier is  $a b$ , and the space  $a 2$ , on the base line, is the length; therefore, from 2 set off to 1, the measure of the thickness equal  $a b$ , and by the point of distance  $D 1$ , transfer that measure to the farther part of the representation of the pier, as at 3, 4; and again transfer that square at the base of the upper part of the wall or pier, as at 7, 5, 8, 6, by the methods already taught. Then through the points 7, 6, draw a right line, which line is a diagonal of the square dimensions of the pier at the farthest angle; consequently, it is the mitre line for any moulding or projecting fascia that may be placed upon the pier; as in the example it is the mitre line upon which the projection of the plat-band  $M F$  must be constructed.

If more mitre lines be required, it will be necessary to draw as many squares as there are mouldings; which, it must be allowed, occasions much trouble, that can be avoided by no other method than by laying the picture or drawing upon a long table, and then finding the proper point of distance, and from that point drawing the diagonals or mitre lines required. Thus the block B, Fig. 3, in the same Plate, being square, the mitre lines  $a, b, c$ , and  $c, d$ , are found by drawing lines through the angles  $a$  and  $c$ , from both points of distance  $D 1$ , and  $D 2$ .

It must again be repeated, that no one who is unacquainted with architecture, or who knows not the construction of mouldings, can expect to succeed in the representations of such objects; nor is it possible to give an explanation by words or drawings sufficiently clear for their instruction. Therefore, they must apply to the forms, and by examination make themselves masters of their constructions.

In Plate IX. Fig. 3, is an example for finding the representation of what is called a hiped roof.

The process is as follows: complete the plan of the building, as  $a$ ,  
N . . . . .  $b, c$ ,

**SECT. II.** b, c, d, and draw the diagonals a d, b c, and at their intersection f, draw the line f h 2, perpendicular to the horizon.

Plate IX.

Divide the front of the building a b, on the base line, as at y, and draw the line y g 2, perpendicular to the horizon, and upon that line set up the whole height of the roof, as from y to g 2.

From g 2 draw a right line to C, the center of the picture, that may intersect the line f h 2, in the point h 2, which will mark the height of the roof upon the center line f h 2.

From the points e, g, o, draw lines to h 2, and those lines will express the hips or angles of the roof.

The point h 2 might also be obtained by the following method :

Continue the lines of either of the angles of the building, as a e, or b g, upwards, and upon either lines set up the given height of the roof, as at g 3, from which point draw a line to the point D, the distance of the picture, which will intersect the line f h 2, at h 2 ; which is the height required.

This variety of operation is founded on the consideration of the different positions in which a plane may be supposed to pass through the center of the building ; for a plane may be supposed to pass through the center f h 2, parallel to the sides a, c, b, d, and vanish in the center of the picture, which is the first operation ; but in the second, a plane is supposed to pass through the center of the building diagonally, in the direction of the line a f d, and to vanish in the point D, the distance of the picture.

☞ The student must observe, that in the whole course of this Section no other vanishing points are employed than the center and distance of the picture, which last point is always placed upon the horizontal line, when the objects to be represented have their sides at right angles with each other, and those sides disposed parallel, and perpendicular to the picture.

But there is also another position of square or right angular objects, in which those points disposed in the same situation are sufficient; as when a square or parallelogram has the sides inclined to the picture in an angle of  $45^\circ$ ; for in such case, the distance of the picture placed upon the horizontal line, is the vanishing point for the sides of such object; and if it be a perfect square, the center of the picture is the vanishing point for one of the diagonals.

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II.  
Plate II.

In Plate II. Fig. 3, is an example of squares inclined to the picture in an angle of 45 degrees, together with a cube and block, in the same position to the picture, standing upon two of those squares.

*Process for the Squares.*

When the center of the picture is determined, as at C, on each side of it set off the distance of the picture D D; then take the measure of the \* *diagonal* of the given squares which is the line a b, Fig. 4, and set on the ground line or base line of the picture as many of such measures as may be required, as 1, 2, 3, 4, 5; and from each of those points draw lines to the points of distance D D; and the mutual intersections of those lines will produce the representation of the squares required.

The cube E and prism B are each situated upon a square of the pavement; therefore, at the angles of the square which forms the

\* It must be remembered, that in all cases similar to this example, where the sides of the square are inclined to the picture in an angle of  $45^\circ$ , that the measure of the *diagonal* of such square must be employed, not the measure of the side of the square.

To obtain the measure of the diagonal, it may be necessary to draw the square geometrically, with its diagonal, to the proportionate size upon a separate paper, or upon a detached part of the drawing, as at Fig. 4, in which the line a b is the diagonal.

As squares disposed like the example frequently form the pavement for the exterior and interior of a building, it is proper to observe, that in views of particular objects, the measure of the diagonals of the originals must be taken; but in compositions, any proportion may be employed as shall be most agreeable to the purpose of the artist.

SECT. II.   
 Plate II. base of each, draw lines perpendicular to the horizon, as the line P in the prism B.

Then consider where the faces of the cube or prism would intersect or cut the picture, provided those faces were continued forward. Thus the lower line in the face B of the block intersects the picture in the point 1, and the lower line of the face E of the cube intersects it at 5: therefore, at the points 1 and 5 draw lines perpendicular to the horizon, and upon those lines set up the heights required, as from 1 to O, for the block B, and from 5 to n, for the cube E; and from those points draw lines to the points of distance D, D 2, and they will cut the perpendicular lines that form the angles of the cube and block, and determine the heights required. Thus the line from O to D cuts the angle of the prism B at P; therefore from P draw another line to the opposite point D 2, and the form of the prism will be completed.

In this example the cube E and prism B are placed exactly upon two of the squares of the pavement, and therefore their bases are those squares whose dimensions are found by the figure of the pavement: but if they were not placed upon the squares, yet their bases must be found by the same process, observing, that their diagonals are parallel, and perpendicular to the picture; consequently the representations of the diagonals which are parallel to the picture have no vanishing point, while the representations of those which are perpendicular vanish in the center of the picture C.

The Student having gone through this section, it may be presumed that he is possessed of the leading principles of the science, and, consequently, that he will be able to comprehend the following Theorems, which may be considered as Axioms.

First, The center of the picture must never be out of the canvas or tablet.

Secondly,

Secondly, All lines whose originals are parallel among themselves, have one, and the same vanishing point for their representations.

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II.  
Plate X.

Thirdly, All lines whose originals are parallel to the picture, have their representations also parallel to each other in the picture, consequently have no vanishing point.

Fourthly, The center of the picture is the vanishing point of all lines perpendicular to the picture.

Fifthly, The distance of the picture when placed upon the horizontal line, is the vanishing point of all horizontal lines that are inclined to the picture in an angle of  $45^{\circ}$ .

Let it also be remembered, that the point which is vulgarly called the point of sight, is properly the center of the picture, and therefore can only be considered as the representation of the point of sight; and this point is unique, there can be but one in the picture, although there may be innumerable vanishing points, which are often vulgarly, but falsely, called points of sight.

The author has dwelt on the above theorems with some prolixity, in the hope of impressing upon the mind of the Student those principles which are the foundation of the science, and which must be clearly understood before any great progress can be made by those who wish to comprehend the following Sections.

## S E C T I O N III.

*Containing Examples of Objects, the Sides of which are inclined to the Picture.*

**I**N this Section will be shewn the true methods of drawing in perspective, right lined objects or figures, the sides or faces of which are inclined to the picture, in any angle greater or less than  $45^{\circ}$ .

As this section is founded upon a \*problem of Dr. Taylor, which may be considered as the test of the science, the author will attempt, in as familiar a manner as the subject will admit, to explain and demonstrate the true methods of finding the vanishing points of lines which are inclined to the picture only; and the Student will do well to make himself thoroughly master of this section, for when he understands this clearly, he may consider himself as possessed of the master-key to all the difficulties of the science.

When various original lines are parallel, and perpendicular to the picture, the center of the picture and the point of distance are the only vanishing points that are necessary to their delineation; as has been shewn in the foregoing section. But when the original lines are

\* See Def. 5, Brook Taylor's first edition, 1715; and Def. 17, second edition, 1719.

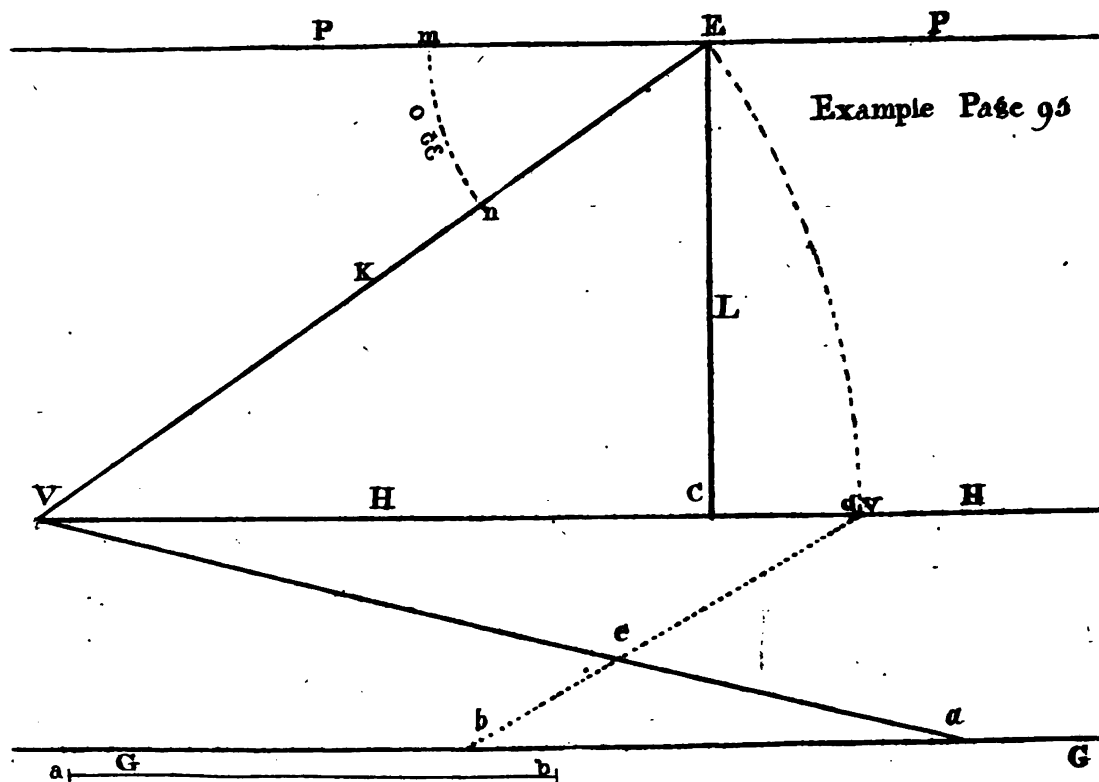
disposed



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### SECT. III.

**Example Page 95**



\* By original line, or original object, is meant some real line or object, of which that in the picture is only the representation.

the

**SECT. III.** the horizontal line H H, at its proper height above the ground line.

Plate,  
Page 95.

Determine the center of the picture C, and through it draw the prime vertical line C E, perpendicular to the horizontal line.

Having drawn these lines, upon the vertical line mark the point E, \* at the same proportionate distance from C, as the spectator is supposed to stand from the picture.

Through the point E draw the line P P parallel to the horizontal line, which line is the parallel of the picture, for it is parallel to the ground line G.

At the point E, construct † an angle with the line P P, equal to 35 degrees, as the angle n E m; and through n draw the line K, and continue it till it cuts the horizontal line; and the intersection of that line at V will be the vanishing point for the representation of a line inclined to the picture in an angle of 35°, or any number of lines parallel to it.

The foregoing are the preparatory lines, necessary to produce the representation of the line required; which is found as follows:

Let *a* be supposed the *intersection* of the original line with the picture; from *a* draw a right line to the vanishing point V; then will the line *a* V be the indefinite representation of a line inclined to the picture in an angle of 35 degrees.

Thus is the indefinite representation of the line *a* V found, the original of which inclines to the picture in an angle of 35 degrees; and all lines that are inclined to the picture, have their representations found by a similar process; the only difference being in the angle

\* The point E is the same point which, in the foregoing section, is placed upon the horizontal line, and is the distance of the picture, and generally marked D. It is the different disposition of this point which constitutes the great difference in operation between lines which are inclined to the picture, and those which are perpendicular to it.

† See the instructions for constructing angles, in problem 9th of Geometry.

m E n

m E n, which must always be made equal to the angle that the original line makes with the picture\*.

SECT.  
III.  
Exam.  
Page 96.

When it is required to cut off from the indefinite representation of a line, a portion equal to a given measure, the following is the process:

Let the line a b, which is below the base line G G, be equal to the measure which is required to be cut off from the line a V. Fix one point of the compasses upon the vanishing point V, and take the length of the line V E, which bring down upon the horizontal line to the point d v; then is d v † the distance of the vanishing point V.

Then take the length of the original line a b with compasses, and with one foot fixed upon the point a, in the base line G, mark off the point b, making a b equal the given line a b.

From the point b, draw a right line to the point in the horizontal line marked d v, which will intersect the line a V in the point e: then will the space a e be the representation of a line equal in length to the original line a b, and inclined to the picture in the given angle 35°.

#### *A Square inclined to the Picture.*

Having well considered the foregoing example, the student may proceed to Fig. 1, Plate XI. which represents a square of 6 feet

PLATE  
XI.

\* Here it may be observed, that what is so much insisted upon in this treatise, namely, the difference between the center of the picture and the point of sight, may be demonstrated by this diagram; for C is absolutely the center of the picture, whereas the point of sight is only represented by the point E.

The above process is, in the opinion of the author, the most elegant and simple that can be employed: but there is also another method, somewhat different in practice, though the same in theory, which shall be shewn hereafter.—See Section VI. Plate XXXVII. Fig. 2, page 247.

† The point d v is by Dr. Priestley called the measuring point. See his Treatise, page 39.

O

dimensions,

III.  
 S E C T. dimensions, of which, the sides D and C, are inclined to the picture  
 in an angle of 30 degrees.

Plate XI.

The height of the eye is 6 feet, and the distance  $11\frac{1}{2}$  feet.

Determine the center of the picture as marked, through which draw the horizontal line H, and the prime vertical line \*X D; and upon that line set up the distance  $11\frac{1}{2}$  feet, as from the Center to D, which is the distance.

Through the distance D draw the line P P, parallel to the horizontal line H, which line is the parallel of the picture.

At the point D construct the angle P D M, equal to the given inclination of the object to the picture, as thus: from the point D, (which is the representation of the eye) draw a right line which shall make the given angle 30 degrees with the line P P; and the intersection of that line with the horizontal line, as at V 2, will be the vanishing point required.

Through the eye D draw another right line, as F, *perpendicular* to the line D E, and its intersection with the horizontal line, will give the other vanishing point, as V 1.

Having thus found the two vanishing points, find the distances of those vanishing points as follows:

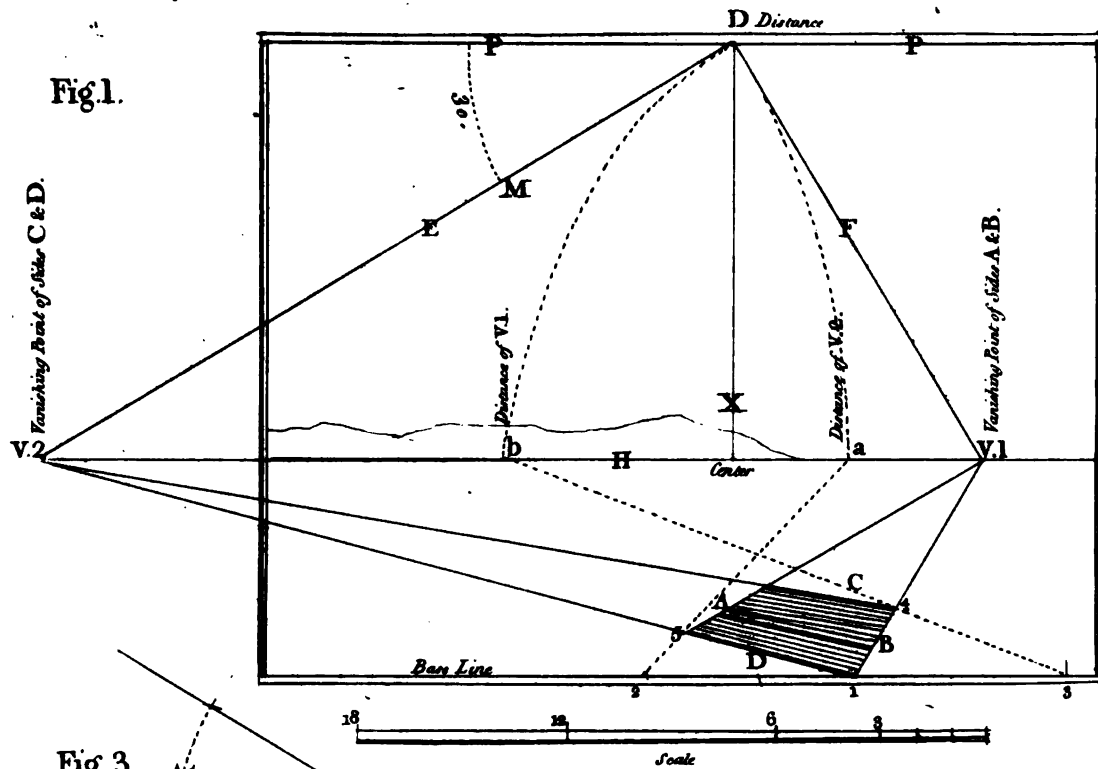
Take the lengths of the radials, or lines D V 1, and D V 2, by the compasses, and mark those lengths on the horizontal line, as from V 1 to b, the length of the line F; and from V 2 to a, the length of the line E; then will b be the distance of the vanishing point V 1, and a the distance of the vanishing point V 2; and they are so written in the example.

Having determined the vanishing points and their distances, draw the nearest sides of the square; that is, from the point 1 in the base line, which is the seat of the angle of the square upon the picture,

\* The prime vertical line is always perpendicular to the horizontal line.

draw

# PLATE XI



**Fig. 3.**

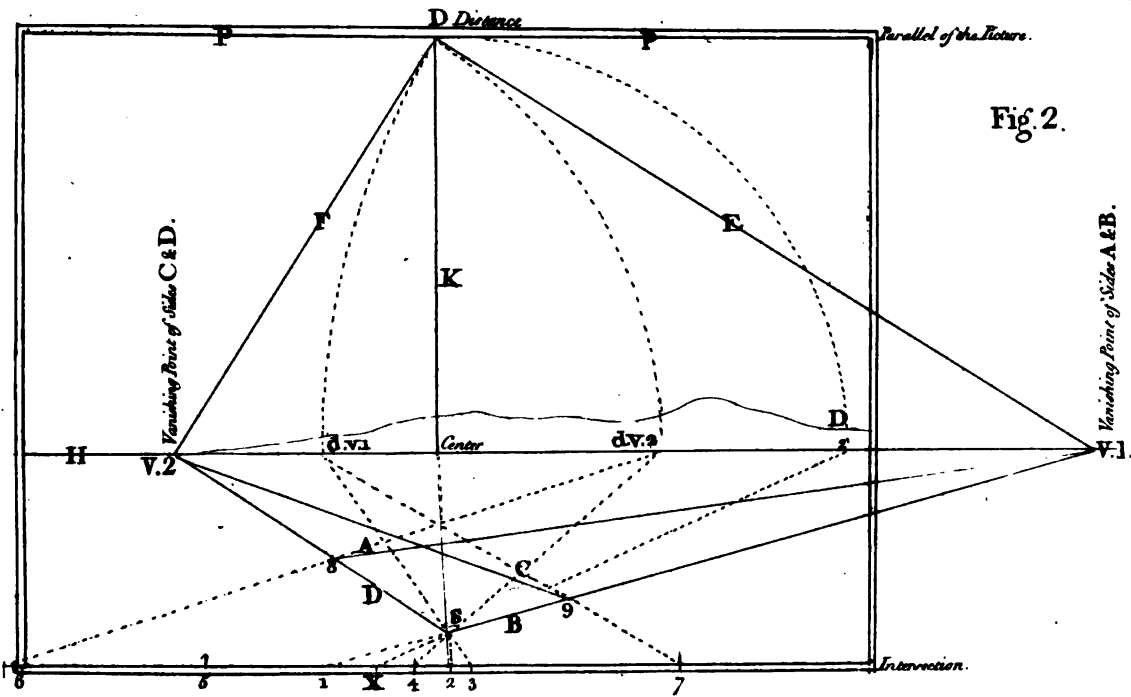
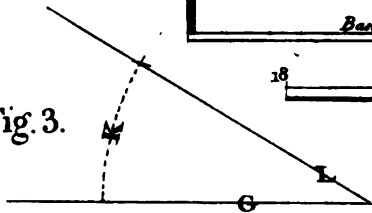






Fig. 1

E 2

point



Fig. 2





draw lines to the vanishing points V 1 and V 2, as the lines B and D, which are the indefinite representations of the sides D and B of the square. SECT.  
III.  
Plate XI.

By the points a and b in the horizontal line proportion the representations of the sides of the square, thus: take the given measure of the square in the compasses, 6 feet by the scale, and set each way on the base line from 1 to 2 for the side D, and from 1 to 3 for the side B. Observe that the angle 1 of the square touches the picture, and therefore is its seat upon the picture.

From 2 draw a right line to a, and where it cuts the line drawn from 1 to V 2, as at 5, will give the perspective proportion of the side D of the square.

Repeat the same process from 3 to b, and the intersection 4 of the line which is drawn from 1 to V 1, will give the perspective proportion of the side B of the square.

From 5 draw a right line to the vanishing point V 1, and from the point 4 draw a right line to the vanishing point V 2, and the representation of the square A B C D will be completed\*.

When the object is represented as removed *beyond* the picture, the process is somewhat different from that employed in the foregoing example. The difference of appearance is shewn in Fig. 2 of Plate XI. where the parallelogram A B C D is removed beyond the picture. The process is as follows:

Let it be supposed that the angle S of the parallelogram nearest to the picture is at the distance of 2 feet beyond it.

Draw the horizontal line H, and determine the center of the picture; draw the vertical line K, and upon it set up the distance of the picture, as at D, which is also marked distance.

\* Observe that the dimensions of the square are formed by drawing lines from the measures placed on the base line, to the *distance* of the vanishing point; as from 2 to a; but the figure is afterwards formed by drawing from the point 5 to the vanishing point itself, as to V 1. This must be strictly attended to.

SECT. From the center bring down the distance of the picture to the  
 III. horizontal line, as at D 2, which is the length of the line K, from  
 Plate XI. the word *Center* to D.

Let the point 2 upon the base line, or intersection of the picture, be considered as the seat, upon the picture, of that angle of the parallelogram which is nearest to the picture.

From the point 2 draw a right line to the center of the picture. Then from the point 2 set on upon the base line or intersection, 2 feet by the scale, as from 2 to X, and from X draw a right line to the distance of the picture D 2, and it will intersect the line that is drawn from 2 to the center, in the point S; then is S the place or seat upon the ground, or horizontal plane, of the nearest angle of the parallelogram.

It is not necessary to repeat the process for finding the vanishing points V 1 and V 2, that being fully explained in the foregoing figure. It needs only to be observed, that the sides of the object have the same inclination to the picture with those of the former, only reversed: therefore, from the point S draw right lines to the vanishing points V 1 and V 2, and cut off the dimensions of the parallelogram, as follows:

Bring down the distances of the vanishing points upon the horizontal line, as in the foregoing example, as d v 1, and d v 2.

Then draw a right line from the point d v 1 through the point S, till it cuts the base line, as at the point 3. From 3 set off the measure of the side B upon the base line to 7, and from 7 return a line to d v 1, which will cut the line that is drawn from S to the vanishing point V 1, in the point 9; then will the space between S and 9 be the representation of the side B of the figure.

Then find the representation of the longest side, thus, from the point d v 2 draw a right line through S, till it cuts the intersection of the picture, as at 4.

Then

Then from 4 set on upon the intersection line, the measure of the longest side D of the figure, twelve feet to 6, and from 6 return a line to d v 2, which will intersect the line that is drawn from S to the vanishing point V 2, in the point s: consequently, the space between the points S and s represents one of the longest sides of the parallelogram.

SECT.  
III.  
Plate XI.

From s draw a line to the vanishing point V 1, and from 9 draw a line to the point V 2; and the perspective appearance of the parallelogram A B C D will be completed according to its measure, 12 feet by 6 feet, and 2 feet beyond the picture, to which its shortest sides are inclined in an angle of 30 degrees\*.

In the example, page 96 of this Section, may also be seen the method of cutting off a portion of a line, as follows:

d v is the distance of the vanishing point V, for it is the length of the line V E, set off from V, upon the horizontal line H, to d v.

The required length or portion of the line to be represented is

\* As it is of the utmost consequence that the student should clearly comprehend these figures; before he proceeds to the following, it may be necessary to make some further observations.

In the first place, both the examples are bounded by two lines, which are to be considered as the limits of the picture; the inner line at the bottom is the base line, or intersection of the picture, as expressed by the terms, Fig. 1 being marked base line, Fig. 2 intersection; which various appellations have been employed by different authors to express the same line.

The lowest of the upper lines marked P P is the parallel of the picture, as written in Fig. 2. This line may fall within or beyond the upper limits of the picture, as in many of the following examples; for it is not limited by the dimensions of the tablet or canvas, but depends upon the distance of the picture. It is always drawn through the point D, which is the distance of the picture, set upon the prime vertical line, from the center of the picture.

The vanishing points are also one within, and the other beyond, the limits of what may be considered in the example as the canvas or tablet. As this will generally be the case, it will be necessary to have the paper longer than the intended dimensions of the drawing; or it may be laid upon a drawing board of sufficient length to contain the vanishing points.

If a canvas, it may be laid flat upon the floor, or placed against the wall, and the vanishing points found and employed as above directed.

then

SECT. then set on upon the ground line G, from *a* to *b*, and a line drawn  
 III. from *b* to *d v*, &c. cuts the indefinite representation at *c*: conse-  
 Plate XI. quently, the space *a c* represents the length required.

In the three foregoing lessons are contained the most essential principles of this section, for they demonstrate the methods of finding the vanishing points for all horizontal lines that are inclined to the *Picture*; therefore the student is again advised to consider those examples with attention, observing that the first is of a line only; the next of a figure or plan formed of four lines horizontally situated; and the third is similar to the second, with the additional circumstance of being placed *beyond* the *Picture*.

*Rudiments of the Perspective Delineation of a House inclined to the Picture.*

PLATE  
XII.

Fig. 1, Plate XII.

Let B s, D s, be supposed the shell of a small house, the plan of which is oblong, with one window, the side B s being inclined to the picture in an angle of 35 degrees, and the dimensions as follows:

The length of the side B s - - 4 feet 10 inches.

The depth of the side D s - - 3 feet 9 inches.

The height - - - - - 5 feet 9 inches.

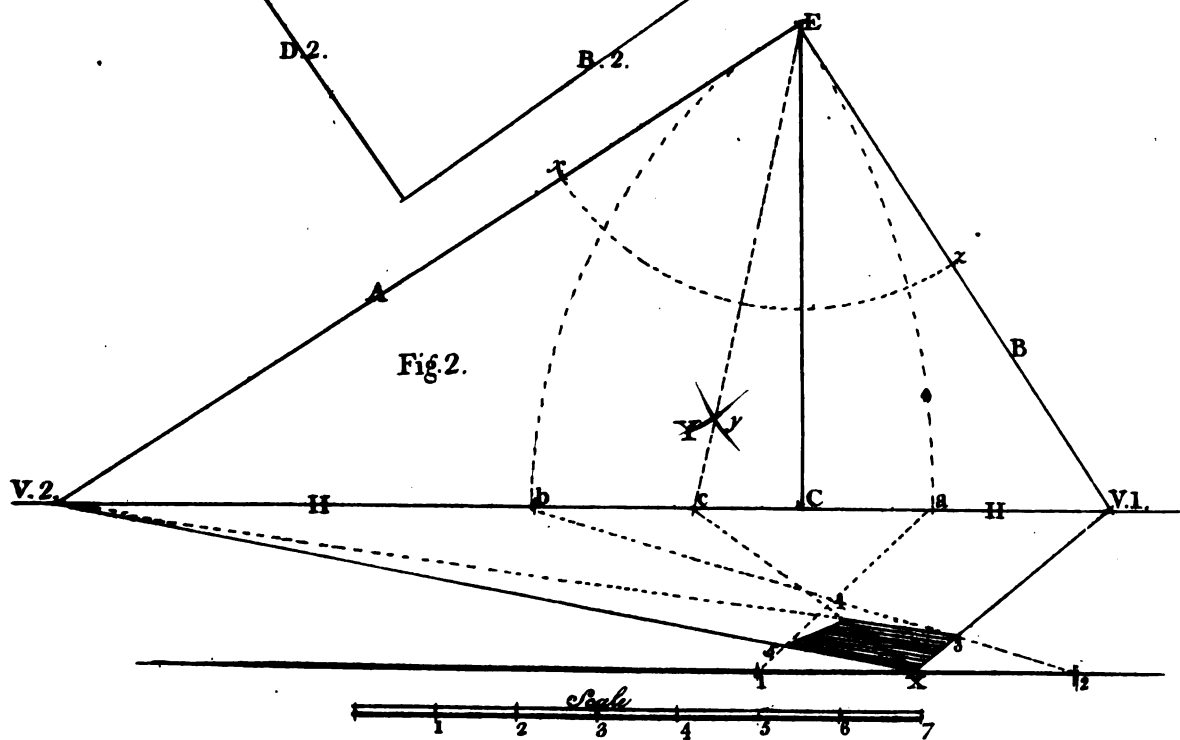
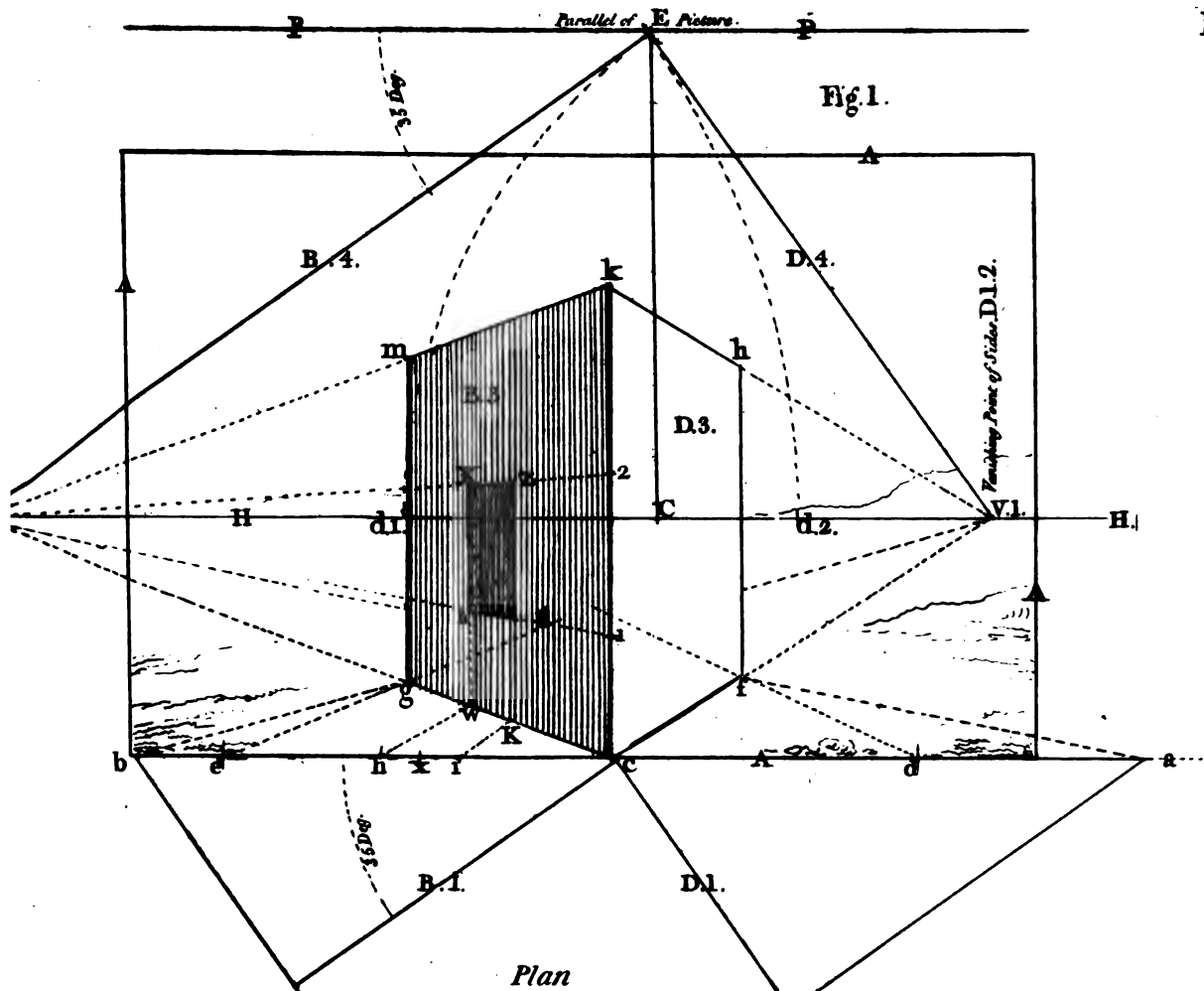
The height of the eye - - - 3 feet.

The distance of the picture - - 6 feet.

Let the lines A, A, be supposed the boundaries of the tablet, or canvas.

Determine the center of the picture C, and the distance E, which is 6 feet, by the scale.

Through the eye E draw the parallel of the picture, which is the right line so marked, parallel to the horizontal line, and marked P P.





At the eye E, construct an angle, with the *parallel of the picture*, of 35 degrees, equal to the inclination of the side B 3 of the object to the picture. In other words, draw the right line E B 4 through E, making the given angle 35 degrees with the line P P, and cutting the horizontal line at V 2, which will be the vanishing point for the side B 3 of the building.

SECT.  
III.  
Plate XII.

Through the point E draw the line D 4 perpendicular to the line B 4, and its intersection V 1 with the horizontal line will be the vanishing point of the side D 3 of the building.

Having found the vanishing points V 1, and V 2, bring down their distances to the horizontal line, that is, take the lengths of those lines from the points V 1 to E, and also from V 2 to E; and mark them on the horizontal line, as at d 1 and d 2.

Thus are the vanishing points and their distances found.

Having determined the point c in the base line of the picture, as the point where the angle of the building is placed; from that point draw right lines to the vanishing points V 1 and V 2, which will give the *indefinite* representations of the base lines of the sides of the building, as c f, V 1 and c g, V 2.

Then cut off the dimensions of those sides as follows:

With the compasses take the given length of the side B 3 from the scale, 4 feet 10 inches, and set it on the base line of the picture from c to e, and also by the measure from the scale 3 feet 9 inches, and set it from c to d; from e draw a right line to d 2, which will intersect the line that is drawn from c to V 2 at g; and a right line drawn from d to d 1 will intersect the line that is drawn from c to V 1, in the point f: then will c g represent the lower line of the side B 3 of the building, and e f the lower line of the side D 3.

Then raise the sides by the following process:

At the point c, which is the nearest angle of the building, draw the

**SECT.** the right line c.k perpendicular to the horizontal line H H, and at  
**III.** the points f and g draw f h and g m parallel to c k.  
**PlateXII.**

Upon the line c k set up the given height of the building, 5 feet 9 inches; and from the point k draw right lines to the vanishing points V 1 and V 2, and their interfections with the vertical lines drawn from f and g will form the sides of the building, as the interfections at c, k, f, h, produce the side D s, and the interfections at c, k, g, m, produce the side B s.

Thus will the general form of the object be completed, in which figure is comprehended the rudiments of almost all objects that fall within the notice of the painter or architect; because the general principles of such objects require, that their sides should be at right angles with each other, or, as vulgarly called, square.

To find the representation of the window or aperture, proceed as follows:

Upon the angle of the building c k, set up the measure of the height from the ground to the sill or bottom of the window, as from c to 1, and above that point the height of the window, from 1 to 2; and from those points draw lines to the vanishing point V 2.

Then set off the width of the pier on the base line from c to n, 1 foot 10½ inches, and from n to h, the width of the window, 1 foot.

Then from the points n and o draw right lines to d 2 the *distance* of the vanishing point V 2, and the interfections of those lines with the line drawn from c to V 2, as at K w, will give the apparent width of the window.

At the points K w draw lines parallel to c k, which will intersect the lines which are drawn from the points 1 and 2, in the vertical angle c k, and produce the apparent dimensions of the window, as z s x y.

If the window or aperture is placed in the middle of a side, as in  
 this



this example; its width and place may be found by another process : Thus, divide the space between c and e on the base line, into two equal parts, which will give the middle X ; then from that point on the base line set off, on each side, half the measure of the breadth of the window, as from X to n, and on the other side from X to h, and draw lines from those points to the distance of the vanishing point d 2, and finish the aperture as before.

SECT.  
III.  
Plate XII.

In this and the three preceding examples, the student must pay particular attention to the process by which the true dimensions of the representations of objects are obtained. For this purpose let him note, that after any vanishing point is determined, then the distance, of that vanishing point, must be employed to measure, or proportion the parts, or divisions of such line or lines, as are drawn to that vanishing point.

Thus, when the vanishing point V 2 is found, then the length of the line or radial B 4 (which is drawn from E to V 2) must be laid down on the horizontal line, as from V 2 to d 2, then will d 2 be the point for dividing or measuring all the proportions which may be required in the line or lines which vanish into V 2.

The plan which is below the intersection or base line, shews the geometrical situation of the object to the picture. It is further explained in the Sixth Section.

*N. B.* The dimensions which are given to this example may probably be thought frivolous ; but let what is called one foot be considered as four, and the proportion will be found equal to the purpose for which it is intended ; and as the scale is by this means less confused than if more divided, the student will have less trouble in the operation.

The manner of obtaining the appearance of the thickness of the wall, which is seen through the aperture, is not explained in this example, to avoid a confusion of lines ; it will be shewn hereafter.

P

*Example*

SECT.  
III.

*Example for drawing a House, of which the Front F and Side K are inclined to the Picture.*

Plate  
XIII.

Plate XIII. Fig. 1.

The front F is inclined 53 degrees to the picture.

The dimensions of the house are as follows :

The height - - - - - 29 feet.

The width of the front - - - - - 33 feet.

Depth - - - - - 22 feet.

From the ground to the top of the lowest window 9 feet.

Bottom of the upper window - - - - - 12 feet.

Height of the middle window - - - - - 17 feet.

From the top of the middle window }  
to the bottom of the upper } - - - 4 feet.

Height of the upper window - - - - - 4 feet.

Width of the windows - - - - - 3 feet.

Door of the same height with the windows, width 5 feet.

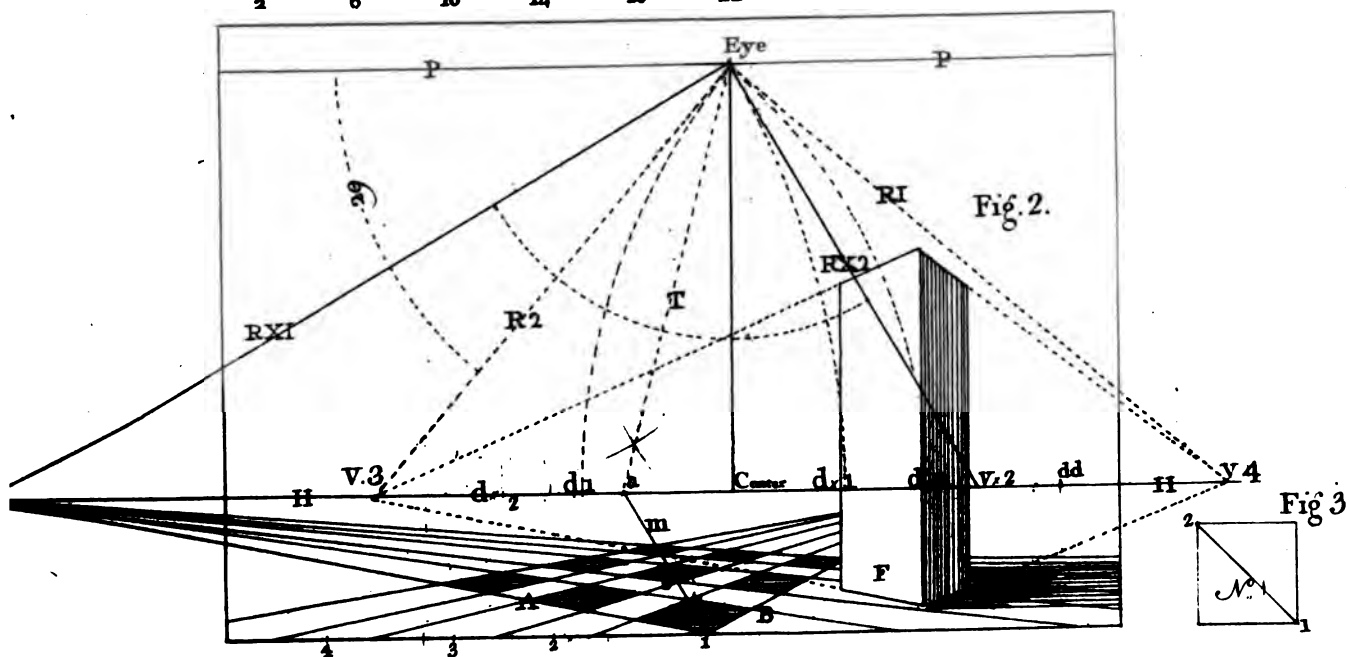
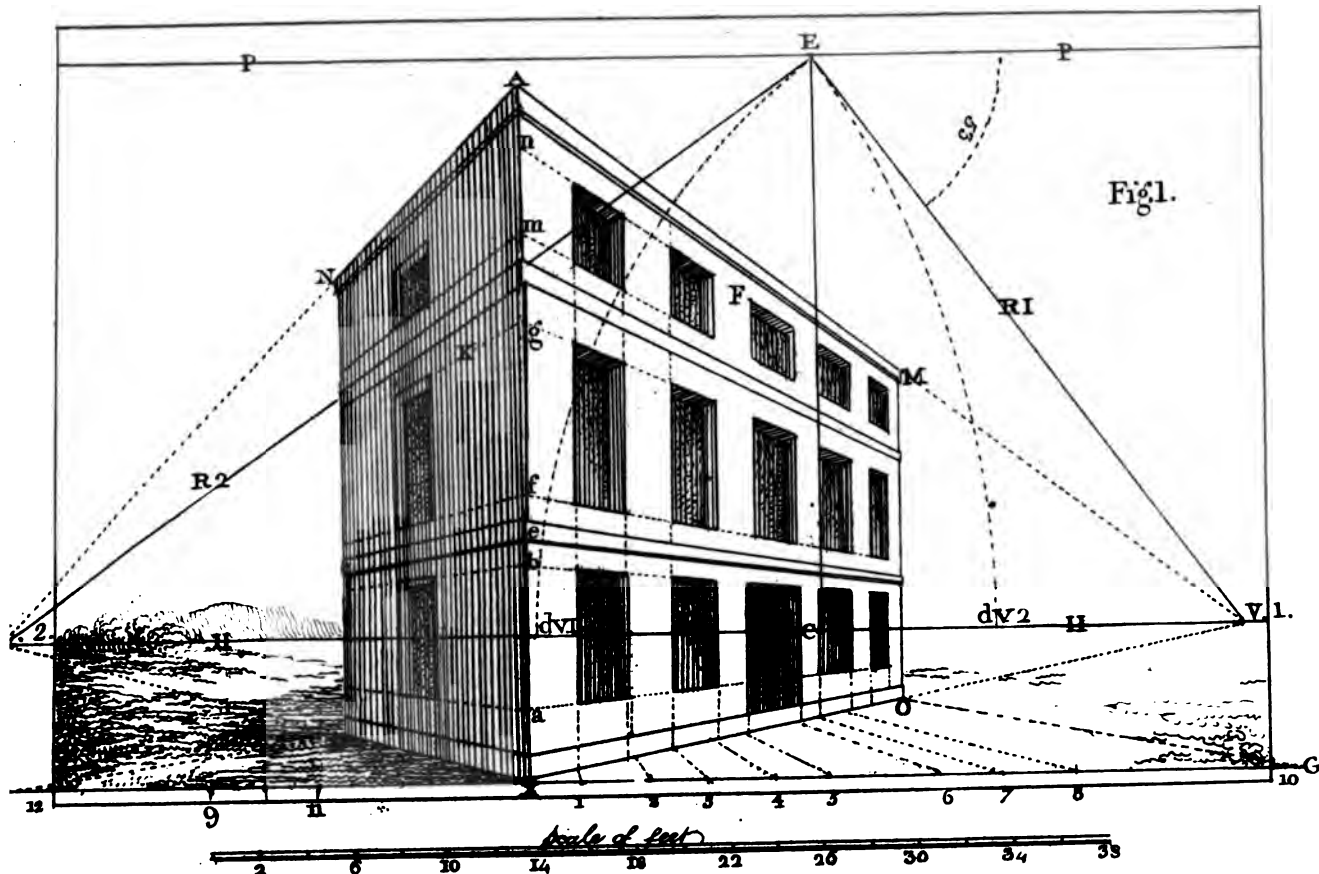
The height of the eye is 6 feet, and the \* distance of the picture 23 feet. That is, from the base line G, to the horizontal line H, is 6 feet by the scale; and from C, the center of the picture, to E which is the distance, is 24 feet.

Let G G be the base line, and C the center of the picture, and E the place of the eye, or distance of the picture: H is the horizontal line passing through C, the center of the picture, as before observed.

The vanishing points are V 1 and V 2; they are determined by

\* The distance of the picture, in this example, is rather too short, not being equal to the height of the building; but it was chosen thus to shew the consequence of such errors, as from this cause the lines A M, A N, and all their parallels, rake or slope too much.

the





the same process which was employed in the preceding example, R 1 being the radial producing the vanishing point of the front F of the house, and the radial R 2 producing the vanishing point of the side K of the house.

SECT.  
III.  
Plate  
XIII.

The distances of those vanishing points are d V 1 and d V 2.

Let X be the intersection of the angle of the building with the picture; or, in more familiar language, suppose it the corner of the building, at which the picture begins.

At the point X draw the line X A perpendicular to the horizon, and by the scale set up the whole height 29 feet from X to A.

From the points X and A draw right lines to V 1, the vanishing point for the front of the house.

Then from X set off upon the base line the whole length of the front of the building 33 feet, to the point 10, and draw a right line to d v 1, that will intersect the line drawn from X to V 1, in the point o, which will give the *apparent* depth of the front F. Draw a line from the point o perpendicular to the base line, or to the horizontal line, till it intersects the line drawn from A to V 1, as at M, and the face of the front F will be determined.

Repeat the same for the end or side K; from X draw a right line to V 2; then set on the base line, from the point X to 12, the depth of the building 22 feet by the scale, and from 12 draw a right line to d v 2, and its intersection with the line drawn from X to V 2 will give the apparent depth at D. At that point draw a right line perpendicular to the horizon, and where it intersects, at N, the line that is drawn from A to V 2, will give the perspective appearance of the side K of the building.

To find the dimensions and places of the door and windows, proceed as follows:

SECT.  
III.  
Plate  
XIII.

For their heights, upon the line X A, set up the measures of the fasciæ and windows, as at a, b, e, f, g, m, and n; and from those points draw lines to V 1, which is the vanishing point for the front F.

Then find their breadths, as follows: upon the base line G, from the point X set off the width of the outer pier, as from X to 1, from 1 to 2 for the window; and continue the same alternate measures of piers and windows with the door, till the space between X and 10, in the base line G, is filled with the measures of those different parts.

From every one of those points 1, 2, 3, 4, &c. draw right lines to the point d v 1, which is the distance of the vanishing point V 1, and where those lines intersect the line drawn from the angle X to V 1, will give the apparent widths of the piers, windows, and door, upon the front F; from which intersections, draw lines perpendicular to the horizon, as is shewn in the example.

To find the breadth of the window in the side K, the same process must be employed as was practised in the front F; setting the measures of the pier and window from the point X towards 12, as at 9, 11, on the base line, and from those points drawing lines to d v 2, which will give the intersections on the line X V 2; which intersections mark the places for the windows of the side.

\* Many lines are omitted in this figure, to prevent confusion; for it is presumed that those which are given at the first division of the windows in the front F, are sufficient to demonstrate the whole, seeing that the other parts are obtained by a repetition of the process already described; nor was it thought necessary to describe the process for obtaining the vanishing points V 1 and V 2, because that has been repeatedly given in the four preceding examples of this

\* The methods for obtaining the projections of the fasciæ are not given in this example; they are explained in a succeeding Part of the Work. See Index.

section. It is sufficient to observe, that the line or radial R 1 inclines to the line P P, which is the parallel of the picture, in an angle of  $55^{\circ}$ , which is equal to the inclination of the front F of the building to the picture: consequently the line R 1 produces the vanishing point V 1; and, as the side K is at right angles or perpendicular to the front F, the radial R 2 is drawn at right angles or perpendicular to the line R 1, thereby producing the vanishing point V 2.

SECT.  
III.  
Plate  
XIII.

*Of the Diagonal when Oblique or inclined to the Picture.*

In drawing the forms of regular squares, it is often necessary to find the representations of the \* diagonals of those squares, particularly when mouldings are to be delineated round a square or right angular block or shaft, in which case the vanishing point of the diagonal will be required.

Therefore, in Fig. 2, Plate XII. an example is given for finding the vanishing point of the diagonal of a square. PLATE XII.

† Let it be supposed that the representation of the square 1 x 3 4 is already drawn; that C is the center of the picture; that E is the eye, and that V 1 and V 2 are the vanishing points of the sides of the square: it is required to find the vanishing point of the diagonal.

Bisect the angle A E B, of the radials A, B; and the line E Y, which bisects the angle, will intersect the horizontal line at c, which intersection is the vanishing point required.

Left the foregoing instructions should not be clearly understood, they shall be repeated in a more explicit manner.

\* Diagonal is a right line drawn across a parallelogram, or other quadrilateral figure, from the vertex of one angle to that of its opposite. Some authors call it the diameter, and others the diametral of a figure. The line X 4, fig. 2, is the perspective representation of the diagonal.

† As the process for finding the representation of the square was given in the foregoing figures, it is unnecessary to repeat the same for this diagram.

After.

SECT.  
III.  
Plate  
XIII.

After having found the radials A and B, with the compasses, on the point E (which is the eye) describe the arc  $x, z$ ; and then with the compasses on the points  $x, z$ , describe the arcs  $y, Y$ . Then from E draw a right line through the intersections of  $Y, y$ , till it cuts the horizontal line at  $o$ , which will be the vanishing point for one diagonal of every square, whose sides vanish into the points  $V_1$  and  $V_2$ ; therefore from X, the nearest angle of the square, draw a right line to  $o$ , and the representation of a diagonal will be produced, as the line  $X_4$  is a diagonal of the square  $X_4, 3, 5$ .

N. B. The student must observe that the line which is called the parallel of the picture is not drawn in this diagram; but this makes no difference, for the angle of inclination, which the sides of the object make with the picture, may be found by means of the vertical line, as follows:

Every angle that is less than a right angle hath its complement, which, added to the given angle, produces the contents of a right angle, which is 90 degrees. Thus to an angle of 30 degrees the complement will be 60, which added together produce 90, the measure of a right angle. The complement of an angle of 40 degrees will be 50, and the same ratio of the rest.

The parallel of the picture and the prime vertical line are always drawn at right angles with each other; and as the radial producing the vanishing point makes a given angle with the parallel of the picture, it must follow that the angle produced by such radial and prime vertical line will be the complement of the primary angle produced by the *radial* and parallel of the picture.

Therefore, if an original line is inclined to the picture in an angle of 35 degrees, its parallel radial will be inclined to the prime vertical plane in an angle of 55 degrees, these two quantities added together producing 90°, equal a right angle.

This



This is also demonstrated by the example, page 95, where E C is the vertical line, and P P the parallel of the picture. SECT.  
III.

The angle m E n, is 35 degrees, formed by the parallel of the picture P, and the radial K, the complement of which is the angle n E L, formed by the radial K and the prime vertical line L, which is an angle of 55°.

Therefore, it is evident that, if an angle be constructed with the prime vertical line L, at the eye or distance E, equal the complement of the inclination of the original line with the picture, which in the example is 55 degrees, the radial K will be produced, and consequently the intersection V, which is the vanishing point, will be the same as if obtained by the angle m E n, made with the parallel of the picture P P\*.

#### *Of Squares inclined to the Picture.*

In fig. 2, Plate XIII. is an example of a pavement of squares inclined to the picture. PLATE  
XIII.

There is also a representation of a square block F, whose sides incline to the picture, but in different angles to those of the squares; consequently there are four vanishing points in the example, two for the squares of the pavement, and two for the sides of the block.

Those for the squares or pavement are marked V 1, V 2, and those for the block, marked F, are V 3 and V 4.

All these vanishing points are found by the process already described, every radial being drawn through the eye, with the same inclination

\* Dr. Priestley, in his Treatise on Perspective, employs the above process for determining the vanishing points of lines inclined to the picture. Vide Sect. iii. page 18 of his work.

**SECT. III.** to the parallel of the picture P P, as the sides of the *original objects* incline to the picture.

**Plate XIII.**

The side A of the pavement inclines to the picture in an angle of  $29^{\circ}$ ; consequently the other side B inclines in an angle of  $61^{\circ}$ .

The side F of the block inclines to the picture in an angle of  $50^{\circ}$ , the side G  $40^{\circ}$ .

This figure is given for two purposes; the first, to demonstrate (what must ever be particularly remembered by the student in perspective) that when the representations of many objects are to be delineated in one picture, they are all governed by one and the same center and distance of picture, though there may be an infinite number of vanishing points for the representations of those objects.

The second purpose of this figure is to shew the method of representing a pavement of squares, when their sides are inclined to the picture; in which case their true representations are best obtained by the following process:

Suppose the sides of the squares to be inclined to the picture in an angle of  $29^{\circ}$ .

Through the eye draw the radial R X 1, making the given angle with the line P P, which will produce the vanishing point V 1.

At the eye draw the radial R X 2 perpendicular to R X 1, producing the vanishing point V 2.

Then find the vanishing point of the diagonal of the square, as follows:

Bisect the right angle formed by the two radials R X 1 and R X 2, by the method employed in Fig. 2 of Plate XII. (see page 110) which will give the line T, intersecting the horizontal line in the point a, which will be the vanishing point for one diagonal of all the squares of the pavement.

Upon

Upon a separate paper, or remote part of the picture, draw the representation of the original square geometrically, at its proper dimensions, by the scale, as at Fig. 3, No. 1, together with its diagonal, as the line 1, 2.

SECT.  
III.  
Plate  
XIII.

Determine the point in the base line, Fig. 2, where it is intended that the angle of one of the squares shall touch the picture, as at the point 1; from which point draw a right line to a, the vanishing point of the diagonal, as the line 1 a.

Then take the length of the diagonal 1 2 in the geometrical square Fig. 3, and set it upon the base line from the point 1 to 2 and 3, and continue those measures for as many squares as may be required; and from every point, as from 1, 2, 3, draw lines to the point d d, which is the distance of the vanishing point of the diagonal 1 a; and the interfections of those lines with the diagonal, at the points 4, 5, will determine the perspective dimensions of the diagonals of the squares, as they recede from the picture.

Through the points 4 and 5 draw lines from the vanishing points of the sides of the square, as from the points V 1 and V 2, and the representations of the squares will be completed.

Another method may also be employed, as follows: determine the point 1 for the angle of the square which touches the picture; from which point draw right lines to the points V 1 and V 2, the vanishing points of the sides of the squares.

Then from the point 1 set off both ways the measures of the sides of the squares, and from those measures draw lines to the distances of the vanishing points; and the lines so drawn will intersect the lines A and B in the proportionate measures required; through which divisions draw lines to the vanishing points V 1 and V 2, and the representations of the squares will be completed.

In this problem it will be necessary to observe, that squares can be situated in no other positions to the picture only, than the following:

Q

First,

SECT.  
III.

Plate  
XIII.

First, The sides parallel and perpendicular to the picture. Example, Plate IV. Fig. 1.

Secondly, The sides inclined to the picture in an angle of 45°. Plate II. Fig. 3.

Thirdly, Inclined to the picture in any other angle than 45 degrees. Plate XIII. Fig. 2.

In the first position, the diagonals of the square are inclined to the picture in an angle of 45°, and consequently have the distance of the picture, when placed upon the horizontal line, for their vanishing points.

In the second position, one diagonal is parallel to the picture, and the other perpendicular; therefore the *latter* vanishes in the center of the picture.

In the third position, both the sides, and also the diagonals, vanish in oblique vanishing points, as has just been demonstrated.

*Table inclined to the Picture.*

Plate XIV. Fig. 1.

PLATE  
XIV.

Example of a table, of which the front o P is \* inclined to the picture in an angle of 49 degrees.

The dimensions of the table are as follows :

The length - - - - - 5 feet 9 inches.

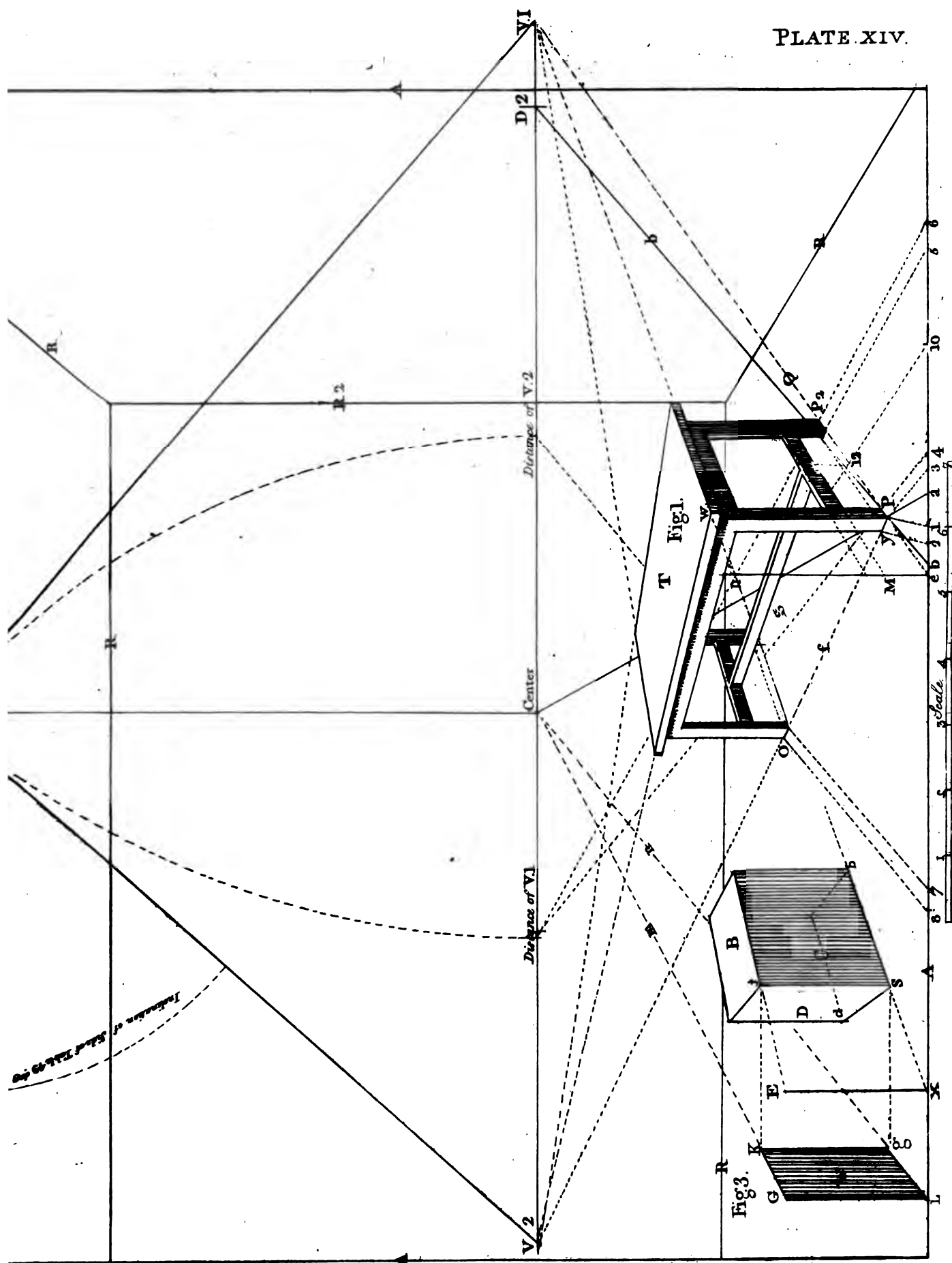
The breadth - - - - - 3 feet 9 inches.

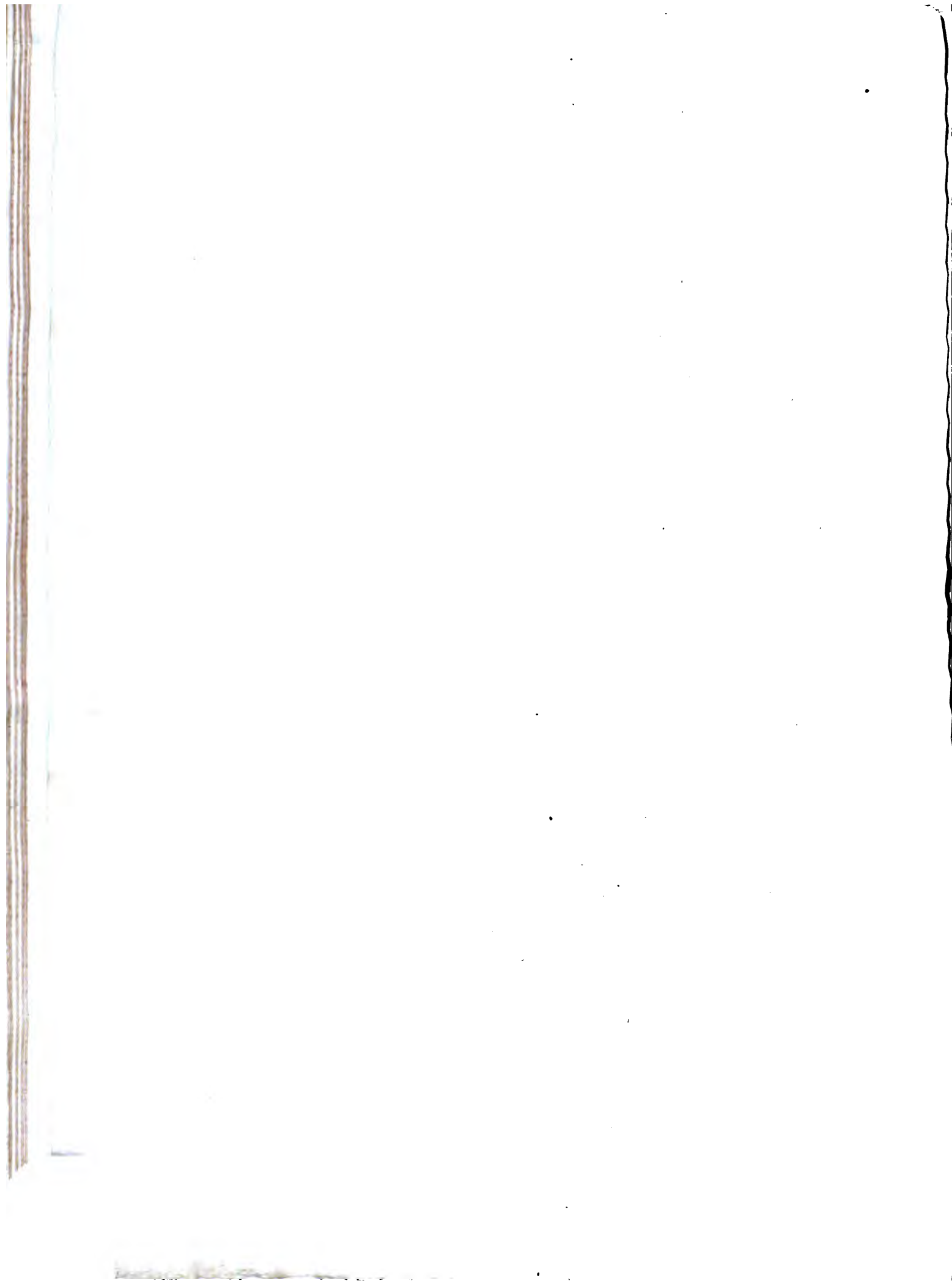
The height - - - - - 3 feet 2 inches.

The thickness of the legs about - - - - 3 inches.

\* In this example the objects are supposed to be standing in a room. The limits of the picture are the lines marked A. The center of the picture is marked by the word center, and the lines marked R are the interfections of the sides of the room with the floor and ceiling, and the line marked R 2 is the interfection of the two sides which are seen: the others are not seen, not being within the angle of vision.

The





The height of the eye is six feet and one inch, and the distance of the picture about 9 feet five inches.

SECT.  
III.

Plate  
XIV.

Determine the center and distance of the picture, and draw the parallel of picture as before directed.

Find the vanishing points V 1 and V 2, by the methods already explained in the foregoing examples.

In this example the table is supposed at a distance beyond the picture; therefore the first part of the process is to find the perspective seat upon the *floor*, of the angle P of the nearest leg, which process is explained in Plate XI. where the angle S of the parallelogram A B C D, Fig. 2. is removed beyond the picture: but that the student may not be obliged to refer back to that example, the process shall be here repeated.

Let a in the ground line be the *seat* of the angle of the leg upon the *picture*. From a, draw a line to the center of the picture; then from a, set off on the ground line the measure of the distance which the leg is from the picture, as at b, which is 1 foot. The distance of the picture, D 1, being first brought down upon the horizontal line to D 2; draw a right line from b to D 2; and its intersection with the line drawn from a, to the center of the picture, will give the perspective seat P, which will be the angle of the nearest leg of the table.

Having thus found the point P, draw lines from that point to the vanishing points V 1 and V 2; which lines will be the *indefinite* representations of the outer sides of the legs of the table.

Then cut off the length and breadth of the table, by the following method:

Through the point P, draw right lines, from the points marked distance of V 1 and distance of V 2; and continue those lines until they cut or intersect the base line, as in the points 1 and 3.

Q 2

Then

SECT.  
III.  
Plate  
XIV.

Then from those two points 1 and 3, set off upon the base line the measures of the front and end of the table: thus from 1 to 8, for the extent of the legs in front, and from 3 to 6 for the extent of the legs on the side; that is, from 1 to 8, five feet nine inches, and from 3 to 6, three feet nine inches.

From the point 8 in the base line, draw a right line to the point marked distance of V 2; and where that line intersects the line which is drawn from the angle P of the leg of the table to V 2, as at Q, will give the apparent limits of the front legs of the table.

Then from the point 6 in the base line, draw a right line to the point marked distance of V 1; and its intersection with the line drawn from P to V 1, as at P 2, will mark the extent of the legs for the *width* of the table.

Having thus obtained the general extent of the legs of the table, as at the points P, P 2, and O; draw lines from those points perpendicular to the horizon, which lines will be the angles of the legs of the table.

Then find the height of the table as follows:

Continue the line which is drawn from V 1 through P, until it cut the ground line at e; and at that point draw the line M perpendicular to the horizontal line.

Upon that line set up the height of the table 3 feet, as at the point n, and from that point draw a line to the vanishing point V 1; and the intersection of that line with the vertical line, which is drawn from P, as at the point w, will be the required height of the table.

For the thickness of the legs, take the measure three inches, and set it on the base line from 1 to 2, for the front of the nearest leg, and from 8 to 7, for the distant leg. From 2 draw a right line to the distance of V 2, which will give the apparent breadth at y of the front of the nearest leg; and from 7 draw another line to the distance of V 2, which will give the apparent breadth of the farther front leg at s.

The



The same process must determine the breadth of the legs at the end of the table, the measures being set on the base line from 3 to 4, and from 6 to 5, and lines drawn from those points to the distance of V 1, which by their intersection with the line drawn from b in the base line to the vanishing point V 1, will give the apparent width of the legs at the end of the table.

SECT.  
III.  
Plate  
XIV.

Then find the place and breadth of the rail at the end, with the stretcher in the middle, as follows:

Upon the vertical line M, set up from the base line the height of the bottom of the rail above the ground, and above that the measure of the breadth of the rail, and transfer those points by lines drawn to the vanishing point V 1; and the \*intersections of those lines with the angles of the legs will mark the apparent dimensions and place of the nearest rail.

The stretcher being exactly in the middle between the legs, divide the space between the points 3 and 6 in the ground line (which space is the extreme breadth of the legs at the end) into two equal parts at 10; and from the point 10 draw a right line to the distance of V 1; and its intersection 12 with the line drawn from P to V 1 will give the middle of the end of the table. Transfer that intersection by a line drawn perpendicular to the horizon, and it will cut the rail at the point 9; from which point describe the †stretcher, by drawing

\* The point e is the intersection of the end of the table with the base line of the picture, that is, if the end P P 2, be considered as a plane continued towards the picture; it will intersect the picture in the line M; which line also cuts the intersection or base line of the picture in the point e.

† It must be observed in this example, that although the general form of the object is simple in its principles; yet it requires so many lines to define all the parts with accuracy in perspective, that if every line were given, the diagram would be rendered so confused, as rather to puzzle than instruct the student: therefore let him reflect, that the same process which gives the height of the rail must be repeated to obtain its breadth; nothing more being necessary than to add the measure above, and transfer it by the vanishing point V 1.

lines

SECT. III. lines to the vanishing point V 2, which will give the form of the  
 {  
 Plate  
 XIV. stretcher uniting with the farther rail.

The projection of the top of the table is obtained by the same process, by which mouldings are delineated in the example given in Plate XVIII. therefore the student is referred to that for farther instruction.

In this Plate is also an example of a block B, the sides of which have the same inclination to the picture with those of the table: consequently the sides C and D are parallel to the front and end of the table, and therefore have the same vanishing points.

This example is given to demonstrate the different methods of determining the height of any object, the plan of which is supposed to be already drawn, in perspective.

The first method is the same with what is generally employed through this work, and is as follows:

Through the angle S of the plan of the block, draw a right line from the vanishing point V 1, that may intersect the base line of the picture, as at X; at which point draw the line X E, perpendicular to the base line, and upon that line set up from X to E the height of the block, and transfer that height to the angle of the object, by drawing a right line from E to the vanishing point V 1, which will mark the height at t.

The apparent height may also be obtained, by taking at pleasure any point in the horizontal line, from which draw a right line through any angle of the plan, as b or S, till it intersect the base line; at which intersection draw a line perpendicular to the base line, and upon that perpendicular line set up the height, and transfer it back by a line drawn to the *same* vanishing point, whence the first line was drawn; and the intersection of such line with a line drawn at the angle S, or b perpendicular to the horizon, will give the apparent height required.

Another

Another method may also be employed, as at Fig. 3, as follows :

SECT.  
III.  
Plate  
XIV.

At any point in the base line taken at pleasure, as at L, draw a line perpendicular to the base line, as the line L N, upon which line set up from the base line the required height of the object, as from L to G.

Then from the points L and G, draw lines to any point in the horizontal line. In the example they are drawn to the center of the picture, as the lines marked m and n, which lines are to be considered as the indefinite representations of the upper and lower edges of a plane, of which the height G L is equal to that of the object, the representation of which is required.

Then transfer the required height, as follows :

At the nearest angle S of the plan of the block, draw a line parallel to the horizontal line, that may intersect the line L n, as at the point g, at which point draw the perpendicular g K; then is the line g K equal to the apparent height required.

From the point K draw the line K t, parallel to the horizontal line, which will cut the vertical angle of the block at t, and consequently determine the height.

Or the height of the line g K may be taken with compasses, and applied from S to t, which will give the height required.

This last given process for determining the heights of objects may be employed to avoid a number of lines, as the operation may be performed on a different paper, or detached part of the same tablet; taking care that the *height* of the eye, and *distance* of the picture, be in the same ratio to each other, as employed in the arrangement of the other objects in the picture.

*Box without Lid inclined to the Picture.*

Plate XV. Fig. 1.

This example is preparatory to the figure in Plate XXIX. in the next or fourth section, and represents a box, the side of which, B, is inclined to the picture in an angle of 41 degrees.

The front A - - - - - 2 feet 8 inches.

The side B - - - - - 2 feet 2 inches.

The height - - - - - 1 foot.

The thickness - - - - -  $3\frac{1}{2}$  inches.

It is about 9 inches beyond the picture.

The height of the eye is 2 feet, so that the box may be supposed standing on a table, the surface of which is 2 feet below the eye of the spectator.

C is the center of the picture, and the distance which is marked by the word eye, is 4 feet 10 inches.

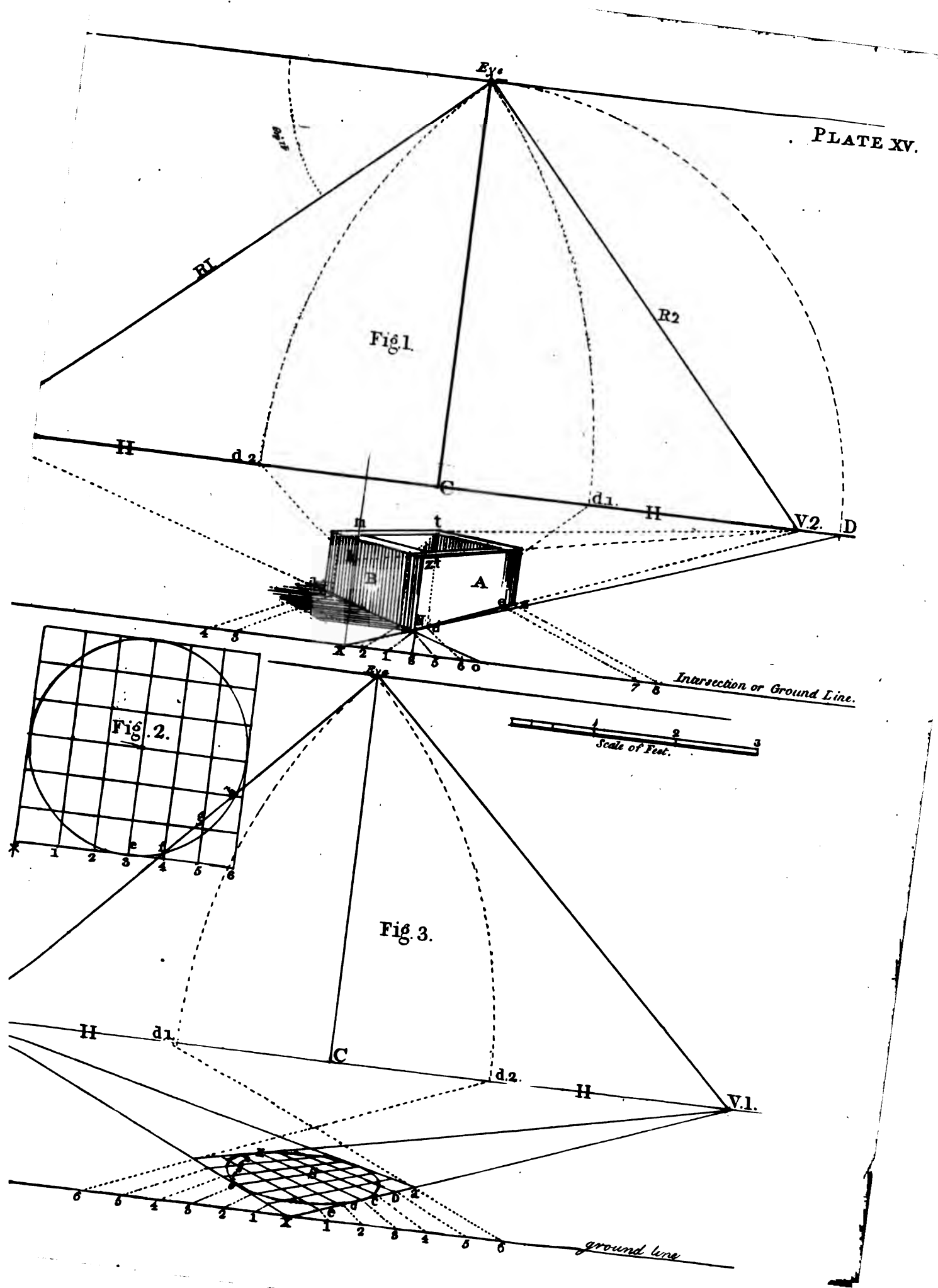
*Process.*

Draw the radial R 1 from the eye, making the given angle with the parallel of the picture 41 degrees, which is the inclination of the side B to the picture.

Draw the radial R 2, perpendicular to R 1, and the intersections of those lines with the horizontal line H H, will give the points V 1, V 2, which are the vanishing points for the sides of the box.

Then determine the distance of the box beyond the picture; for which purpose, suppose S to be the seat of the angle of the box upon the picture. From the point S draw a line to the center of the picture C, and from S on the ground line set off to x, by the scale, the distance of the angle of the box from the picture, which is 9 inches.

Then





Then bring down the distance of the picture to the horizontal line, as at D, by the same process that hath been shewn by Fig. 2, Plate XI. at the beginning of this Section.

SECT.  
III.  
Plate XV.

From x draw a right line to D, and where that line intersects the line which is drawn from S to C, as at N, that point will be the place of the angle required, or the representation of its seat upon the ground.

From the point N, draw lines to the vanishing points V 1, V 2; and cut off on those lines the dimensions of the box, by the following method :

Upon the horizontal line bring down the distance of the vanishing points, as at d 1, d 2, by the methods already directed.

Then from d 1, in the horizontal line, draw a right line through the angle N of the box, till it cuts the intersection or ground line of the picture at 1.

Repeat the same from d 2 through N, till it cuts the ground line at 5.

Then take the measure of the side A, 2 feet 8 inches by the scale, and set off on the ground line from 5 to 8; and also the measure of the side B, 2 feet 2 inches, and set off from the point 1 to 4; and from those points draw lines to the points d 1, d 2, and where those lines intersect the lines that are drawn from the angle of the box N, to the vanishing points V 1, V 2, those intersections will give the apparent dimensions of the box, as at a and b.

Thus the lines drawn from 5 and 8 to d 2, produce the dimensions of the side A at a N; and the lines drawn from 1 and 4, to d 1, produce the side B at N b.

Then find the thickness of the box as follows :

For the side A set off the measure  $3\frac{1}{4}$  inches, \* from 5 to 6, and also from 8 to 7 in the intersection or ground line.

\* Three inches and half is too great a thickness for such constructions, but is given for the better demonstration of the figure—One inch would be sufficient.

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III.

Plate XV.

For the side B set off the same measure from 1 to 2, and from 4 to 3; and from those points draw lines to d 1 and d 2, and their intersections with the base lines of the box will give the thickness, as at e d on the face A gives the thickness for the side B and its opposite, as the similar intersections on the side A indicate the thickness on the side B and its opposite.

Then find the height of the box as follows:

Continue the lower line of the side A, by a line drawn from the vanishing point V 2, till it cuts the intersection or base line at x, at which point draw a line perpendicular to the intersection or ground line, as the line m x, upon which set up the height of the box 1 foot by the scale to h, and from h draw a line to V 2, which line will intersect the lines that are drawn perpendicular to the ground line at the angles N and a, and give the upper angle z of the box; from which point draw lines to the vanishing points V 1 and V 2, which will form the two sides A and B.

Transfer the thickness which is found at d and e in the lower line of the box, to the upper edge, as at t, and from that point and those which are similar, draw lines to the vanishing points V 1 and V 2, and the thickness of the top of the box will be expressed.

It must be observed, that the process employed for finding the thickness of the sides of the box, is equally applicable and proper to determine the thickness of the walls of a house or other building\*.

*Of Circles in Perspective.*

In Plate XV. Fig. 3, is an example for delineating circles in perspective.

\* In the next section this lesson is continued, the box being completed with the addition of a lid—See Plate XXIX.



First draw the circle geometrically at its full size on any other paper and then circumscribe that circle with a square, as in Fig. 2.

SECT.  
III.  
Plate XV.

Divide the sides of the circumscribing square into any number of equal parts, suppose six; and at those equal divisions draw lines, which may divide the large square into a number of smaller squares, producing a reticulation, as in the example Fig. 2.

In this example the square which circumscribes the circle is inclined to the picture; consequently oblique vanishing points, with their distances, are employed in the construction of the figure.

Having determined the center of the picture and its distance, and also the oblique vanishing points V 1 and V 2, by the rules already demonstrated, draw the perspective square S, and afterwards divide it into as many small squares, perspective, as are contained in the geometrical square, Fig. 2: As thus, take the measures of the small squares 1, 2, 3, 4, 5, 6, on the side of the geometrical square, Fig. 2, and transfer them on the ground line each way, from X, as indicated by the figures 1, 2, 3, 4, &c.; and from those points draw lines to the points d 1 and d 2, which are the distances of the vanishing points for the sides of the square, which lines will produce the intersections a, b, c, d, e, upon the sides of the representation of the large square S; from which intersections draw lines to the vanishing points V 1, V 2, and the great square S will be divided into the same number of small squares perspective, with the geometrical square.

The perspective appearance of the circle must then be finished by hand, which can be completed by no other method than comparing the reticulations of the perspective square S, with those of the geometrical one Fig. 2, and then drawing the appearance of the circle through those points in the square S, which correspond with those in Fig. 2. Thus the points e, f, g, h, k, in both figures correspond with

SECT. each other; consequently, those in S are the guides for the required  
 III. representation.  
 Plate XV.

This process is so plain, that a steady examination of the figure will render further explanation unnecessary. It must be observed, that if the circle is circumscribed by a square, whose sides are parallel, and perpendicular to the picture, the process is nearly the same; the center of the picture being the vanishing point for the sides of the square; in which case the distances of the vanishing points are not required.

*Pedestal with Steps inclined to the Picture.*

Fig. 1, Plate XVI.

PLATE  
XVI.

In this example there are three steps, each of which is 6 inches in the rise, and 1 foot in the tread\*.

The face F of the pedestal and steps are inclined to the picture in an angle of 50 degrees.

The height of the eye, or horizontal line, is 6 feet.

The center of the picture and place of the eye are marked.

The distance of the picture is about 11 feet.

H H is the horizontal line.

G G is the intersection or ground line of the picture.

P P is the parallel of the picture, to which the line or radial R inclines 50°, producing the vanishing point V 1.

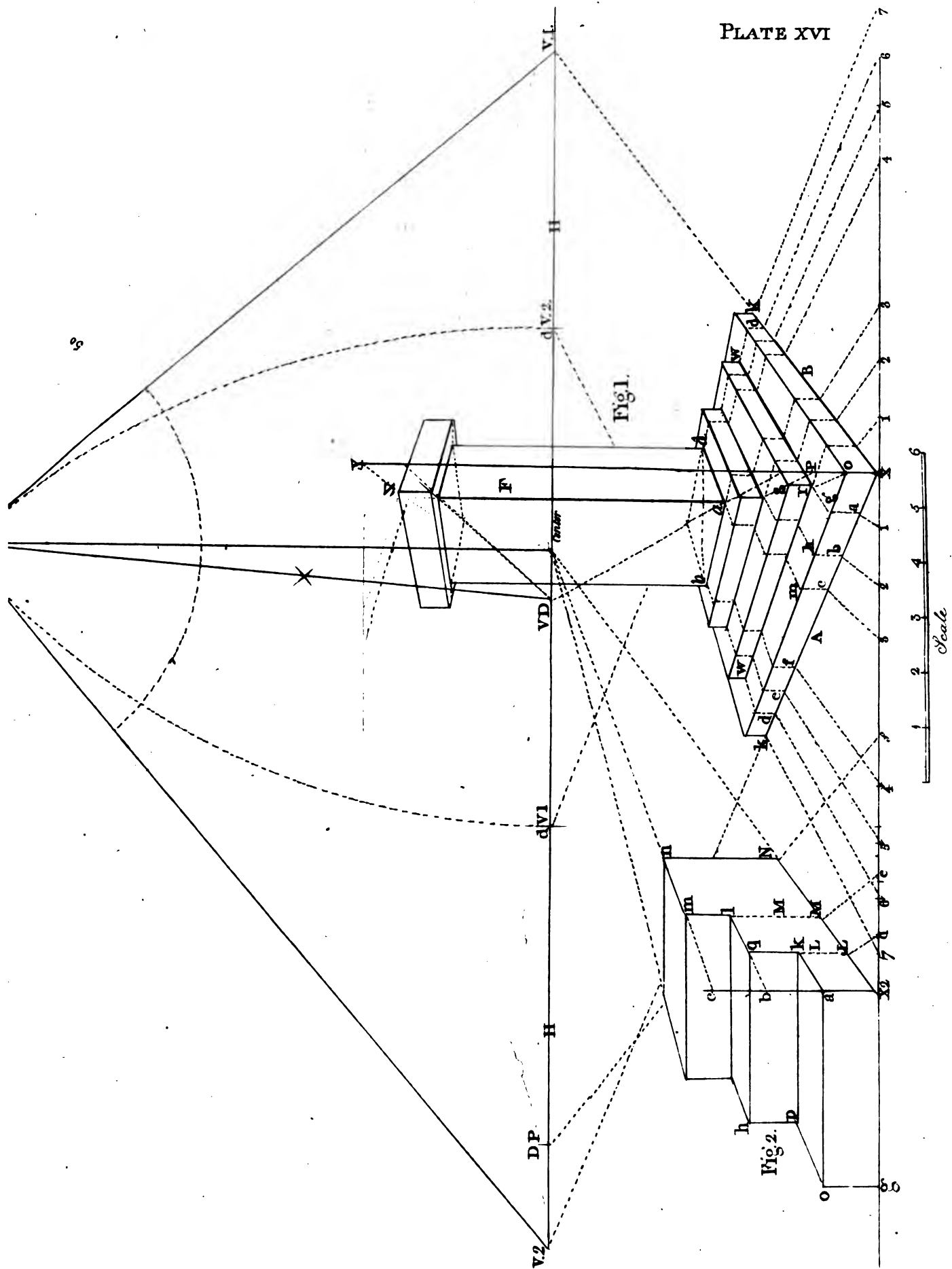
V 1, V 2, are the vanishing points.

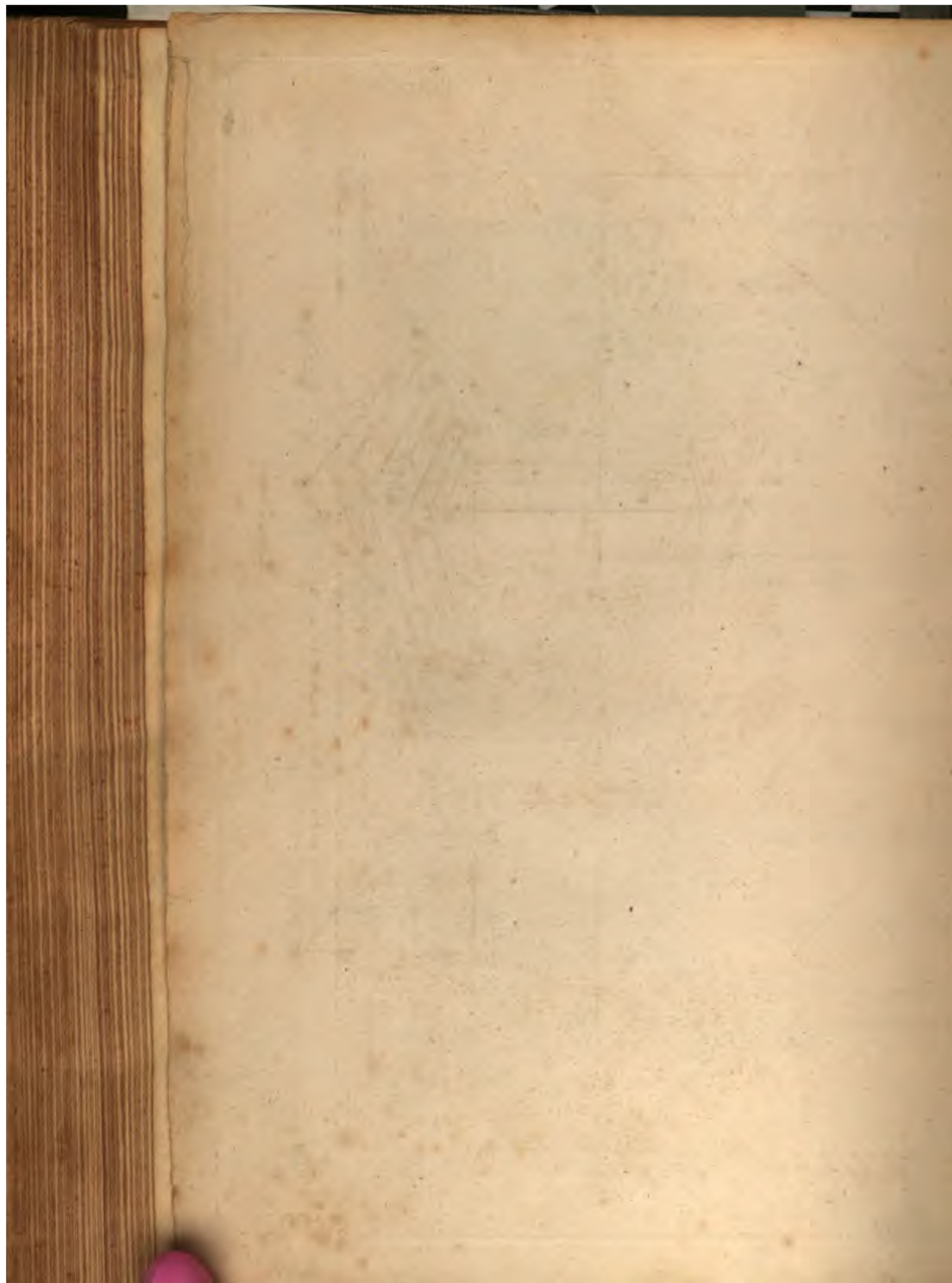
d v 1, d v 2, are the distances of those vanishing points. V D, is the vanishing point of the diagonal.

\* By rise is meant the thickness of the step, or its height from the ground, which is seldom more than 6 inches, generally less.

By the tread is meant the flat part, on which the foot falls, which is seldom more than 12 inches, unless the building to which they approach is large.

The





The vanishing points and their distances are found by the methods already explained. SECT.  
III.

The point X is the nearest angle of the lowest step, which touches the picture. Plate  
XVI.

Therefore from X draw lines to the vanishing points V 1, V 2, as the lines A and B, and at the point X draw the line X Y perpendicular to the base line G G 2.

Upon the line X Y set up the height of the nearest step, as from X to o, six inches by the scale; and from the point o draw lines also to the vanishing points V 1 and V 2.

Then will the lines which are drawn from the points X and o to the vanishing points, represent the indefinite appearance of the fronts of the first or lowest step.

Proceed to find the length of the first or lowest step, as follows:

From X set off on the base line each way to the points 7\*, the length of the lowest step 8 feet 10 inches by the scale, and from those points draw lines to the points d v 1 and d v 2, which are the distances of the vanishing points; and the interfections of those lines with the lines A and B of the steps, as at k k, will determine the apparent length each way of the lowest and longest step.

Then proceed to represent the tread or surface of each step, as follows:

From the angle X of the lowest step, set off each way the dimensions of the horizontal surface or tread of the step, which in the example is one foot†; and repeat that measure as often as there are steps required: as from X to the points 1 2 3 each way; outward from the point X for the nearest angles, and for the farther extreme

\* Observe that the marks of reference are the same on both sides of the steps, because the process is the same on both sides.

† That is, 1 foot from the point o to g.

SECT.

III.

Plate  
XVI.

of each step, from the point 7, the same measure inward; that is, one foot from the point 7 to 6, to 5 and 4.

From those points draw right lines to the points  $d v 1$ ,  $d v 2$ , which will intersect the line A in the points a, b, c, and d, e, f; at which draw lines perpendicular to the horizon, as the lines a g, b h, c m, at the near angle of the step; and also lines in the same direction from the points d, e, f, at the farthest angle of the step; as in the example.

Then determine the nearest angle or corner of the *second* step, as follows.

V D, is the vanishing point of the diagonal of the object; therefore from o, which is the upper angle of the lowest step, draw a line to V D, and at a, draw the vertical line a g; then from g draw a line to V 1, and the intersection of the lines o V D, and g V 1, at r, will give the seat of the angle, (or as vulgarly called, the corner) of the second step at r.

Having found the point r, which, as before observed, is the lowest point of the angle of the second step, draw the vertical line r S: Then upon the line X Y set up the height of the second step, as from o to P, and transfer that measure to the line r S by a line drawn from P, to the vanishing point V D, of the diagonal; and the height of the second step will be obtained by its intersection at r with the line q r.

From r and S draw lines to the vanishing points V 1, V 2, as was done in the first step, which will express the sides of the second step; then cut off the length of the second step, as follows:

From the point 6 in the base line, which is the measure of the length of the second step, draw a line to the vanishing point V 1, which will intersect the base line of the lowest step in the point d, at which point draw a vertical line that may intersect the *upper* line of the lowest

step; from which intersection draw a right line to the vanishing point  $V_1$ , and it will intersect the lowest line of the second step in the point  $w$ , consequently the point  $w$  is the extreme length of the second step.

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III.  
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XVI.

If the instructions given for obtaining the proportions and forms of the two lower steps are well understood, there will be little difficulty in obtaining the proportion of the third, and of the base of the dado of the pedestal; for a repetition of the foregoing process is all that is necessary, even if there were many more steps to be described.

There wants nothing to complete the figure but to find the height of the pedestal, for its thickness is determined by the tread of the third step; because that step surrounds the base of the pedestal, which is defined by the angles  $a b d$ .

Therefore to find the height, draw the vertical angles of the dado or shaft of the pedestal, from the points  $a b d$ , which are found in the upper step, by the same process that determined the lower steps.

Then upon the vertical line  $X Y$  set up from  $X$  in the base line, 9 feet 6 inches to  $Y$ , and from that point draw a line to the diagonal vanishing point  $D V$ ; and the intersection of that line with the angle of the pedestal will give the height required, as at the point  $z$ . From the point  $z$  draw lines to the vanishing points  $V_1$  and  $V_2$ , which will determine the form of the shaft or dado of the pedestal. The method for determining the crown or covering of the pedestal is given in another part of the Work, see Index.

In the course of the foregoing operation, let it be observed, that in marking the measures for the *treads* of the steps, which determine their situations within each other, those measures are applied outwardly on the base line from  $X$ , and inwardly on the same line from  $7$ ; and the space between the points  $3$  and  $4$  is the breadth of the  
dado



SECT. III.   
 {  
 Plate XVI.   
 dado or shaft of the pedestal. It must also be particularly noticed, that the proportions of the treads of the steps are obtained by lines drawn to the *distances of the vanishing points*; but the lines which produce the *forms* of the steps must be drawn to the *vanishing points*.

### *A Garden Seat.*

PLATE XVII. In Plate XVII. is an example for a building with a pediment, which may be considered as adapted to contain seats or other accommodations in a garden.

The center of the picture is C, the distance or eye is at D.

H H is the horizontal line.

P P is the parallel of the picture, as written.

L 1 is the radial or parallel of the front K of the building, which is inclined to the picture in an angle of  $33^{\circ}$ .

L 2 is the radial or parallel of the sides of the building, which are perpendicular to the front, as the side S.

\* B B is the base line.

The vanishing points are V 1 and V 2, determined by the radials L 1, L 2 (as before taught, Page 95); and d 1, d 2 are the distances of those vanishing points.

After having studied the instructions, and practised the rules which are given in the preceding part of this Section, particularly those of the Example of a house inclined to the picture; the student will not require to have them repeated here, for the construction of

\* In all architectural representations, it will ever be the most convenient practice to place the object immediately upon the base line; as in this example, in which the point A is the intersection of the picture, or seat of the angle upon the base line. And after the representation of the building is obtained, to add as much space below as may make the whole appear pleasant to the eye, as the line X X was added at pleasure, after the object was finished.—This method will save a great deal of trouble, yet be equally true, as if the building had been drawn at the same apparent distance from the line X X as it now appears.

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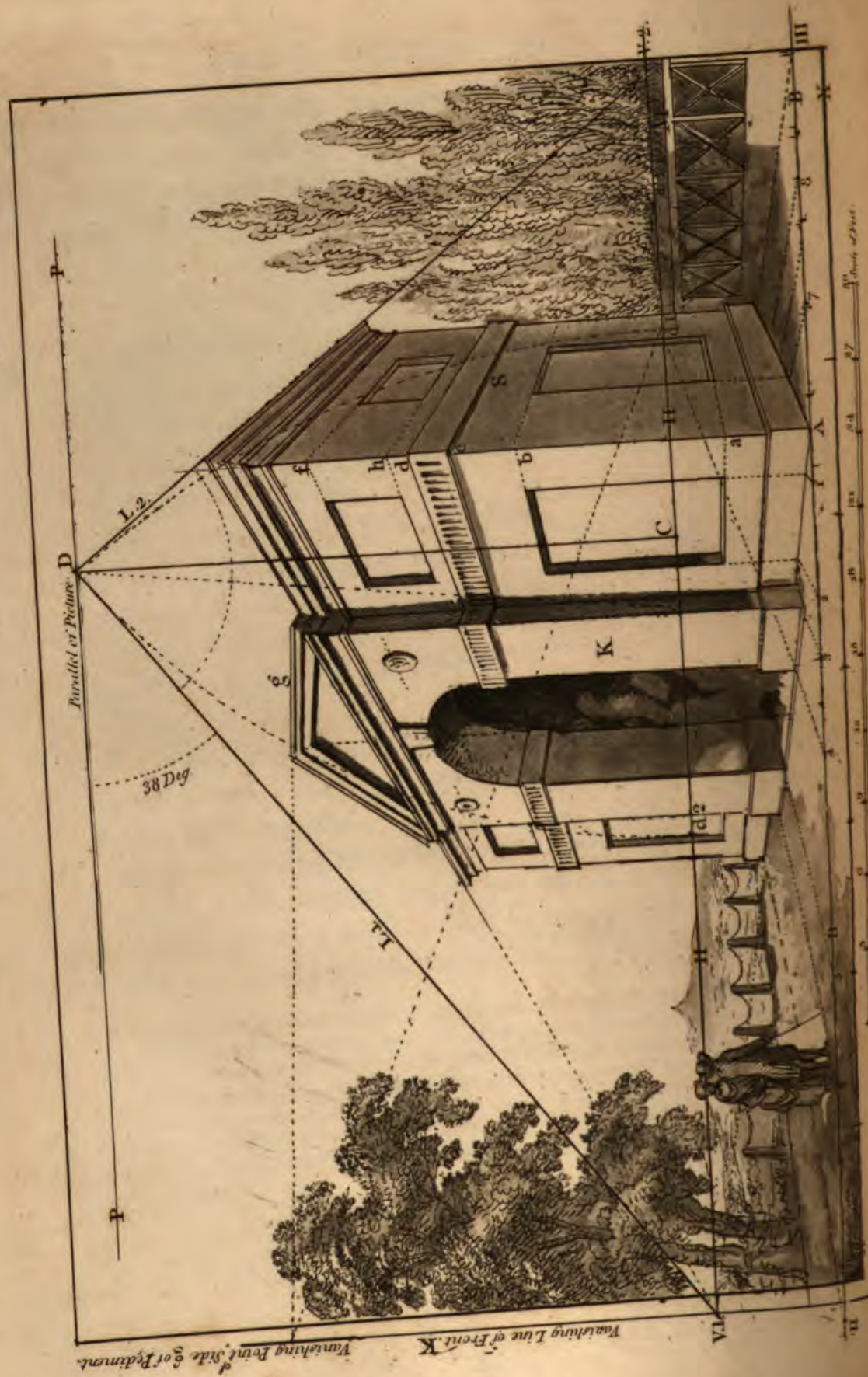
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PLATE XVII.



this figure is produced by the same process which was employed in that example, with the addition of the pediment; for the construction of which, instructions are given in the next Section.

SECT.  
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Plate  
XVII.

Yet it may be proper to observe, that the heights of the sunk panels, and of the fluted fascia, are determined by setting up their dimensions from the point A, upon the angle of the building A f, as at the points a, b, d, h, &c. and from those points drawing lines to the vanishing points V 1 and V 2; which lines determine the heights of the required parts.

The breadths of those parts are found by setting their measures upon the base line B B, from the angle A to the points 1, 2, 3, 4, and 5, on the left side, and from the same angle to the points 7, 8, and III, on the right side, and from every one of those points drawing lines to the *distances* of the vanishing points; as those on the left side are drawn to the point d 1, which is the distance of the vanishing point V 1, and those on the right are drawn to the point d 2, which is the distance of the vanishing point V 2.

The rails or palisadoes, marked M, at the back of the building, are parallel to the front and back; consequently have the same vanishing point with the front, which is V 1.

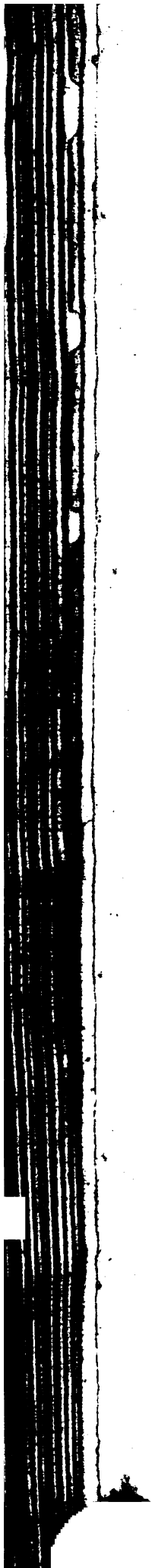
The line of posts and chains is parallel to the ends or sides of the building; consequently has the same vanishing point with the ends, which is V 2.

The figures of the man and woman are supposed of equal heights with the spectator who views the building; therefore the horizontal line of this example passes through the eyes of those figures.

The scale by which the building is drawn, is given at the bottom of the print; therefore the student who considers this example may easily obtain the measures of all the parts; and it will be a good practice for him to employ the following method:

S

Take



The roof is divided into two parts, and the line T Z is in the same plane with the side S of the bell tower; while the side U of the tower is parallel to the end X T of the church, as are also the sides of the porch.

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III.  
Plate  
XVIII.

D 2 is the distance of the picture, brought down to the horizontal line: it is employed to find the point A, which is the seat of the nearest angle of the building upon the ground; which point A is determined by the process employed in example Fig. 2, Plate XI. Page 99.

The point A being found; from that point, draw the lines which form the base of the building, to their different vanishing points, as A V 1, A V 2.

Then find the height of the wall, as at the point W, which is in the angle of the walls of the side and end.

For which purpose, continue the line which is drawn from V 1 through A, till it cuts or intersects the base line, as at the point b, at which point, draw the line b o perpendicular to the horizon; and upon that line set up the known or supposed height of the wall, as from b to 2, which is 18 feet by the scale; and from 2 draw a line to V 1, and it will mark the apparent height of the wall by its intersection at W.

It is scarcely necessary to give a minute detail of the process for obtaining every line in the representation of the object, as such instructions would be no more than a repetition of the foregoing lessons.

Yet, as the general form of the building is rather complex, it might by some be thought unintelligible without further explanation, particularly concerning the receding or remote parts of the object.

It must then be observed, that the building is composed of two parts or divisions, the further and longer part of which may be called the chancel, and is connected with the bell tower.

## SECT.

III.

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XVIII.

\* To find the appearance of what may be called the chancel, that is from T to S, including the tower, proceed as follows :

Suppose the line T n already determined by the rules before given, and consider T as dividing the building, at the part equal the chancel's width, and in the same plane with the face M and S; then from n draw a line to the vanishing point V 2, as n X.

Then through the point n draw a line from d 2, which is the distance of the vanishing point V 2, that may cut or intersect the base line at g; and from g set upon the base line the measure of the whole length of the church 60 feet, and from that point draw a line to the same distance d 2 of the vanishing point, which will determine the apparent length of the building. The height of the spire is determined as follows: through the four angles of the tower draw diagonals, and at their intersection draw a line perpendicular to the horizon, which will be the center, and find its height upon that line by the foregoing rules.

In the example the roof of the church is divided into two parts, each of which has the same inclination to the horizon; which inclination is determined without vanishing points, by the following method :

Suppose the ridge R of the roof to be six feet higher than the angle W of the wall.

The line o b is the intersection of the picture by the plane of the

\* As in this example the plate is not long enough to admit the whole measure of the length of the church, the half may be used, with the half distance, as follows: V 2 is the vanishing point of the side A A of the church, and d 2 is the distance of that vanishing point; therefore divide the space between V 2 and d 2 in half or two equal parts, as at d 2  $\frac{1}{2}$ ; then from d 2  $\frac{1}{2}$  draw a right line through n, which may intersect the ground line, as at z; then from z set on half the measure of the length of the church, 28 feet to y, and thence draw a right line to d v  $\frac{1}{2}$ , and its intersection with the line a drawn from n to V 2 will give the apparent length of the church with equal truth as if the whole measure had been employed.

end

end T X continued forward, and the point 2 in that line is the height of the wall upon which the roof rests; therefore, from 2 to 3 set up the height 6 feet, and from 3 to O, 6 feet also; which is double the height of the roof: at each of those points draw lines to the vanishing point V 1; then continue or produce the line A W, which is the nearest angle of the wall to k, and the line n T, to m, and the farther angle to F. Then draw the diagonals W M, Z k, N m, and Z F; and the pitch or form of the roof will be determined by the lines W R Z and Z L N.

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XVIII.

*Demonstration.*

The points W k Z m, represent the four angles of a parallelogram, seen obliquely, the base of which is W Z, equal the chord or span of the roof required; and R, which is the center of the parallelogram, marks the apex or summit of the roof, the perspective appearance of which is produced by the scalene triangle W, R, Z.

The process for obtaining the representation will be better understood by considering the diagrams marked Fig. 1 and Fig. 2 in the same plate.

The first shews the geometrical form of the roof, the line, 4, 5, being the chord or span, and the point 1 the apex or summit of the roof.

Upon the line 4, 5, as a base, a parallelogram is constructed, whose height is twice that of the roof; consequently the diagonals 2, 5, 3, 4, of the parallelogram coincide with the inclined surfaces of the roof.

It must be observed, that the vanishing point V 4, by which Fig. 2 is drawn, is to be considered as in some horizontal line, and similar to the point V 1 in Fig. 3\*.

\* All the lines and points in Fig. 1, and Fig. 2, are marked by similar letters and figures, by comparing which the student will easily comprehend the process.

This

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This process is more easy in theory than what is employed in the first example of the next Section. Yet both produce the same effect; and as it may frequently happen that the vanishing point for the inclined planes of the roof may lie above the limits of the canvas or tablet, the method here given will, in general practice, be found the most convenient.

*A Chair inclined to the Picture.*

PLATE  
XIX.

Plate XIX. contains examples for drawing a chair in Perspective, when the front is inclined to the picture.

The form of chair represented in the example is by workmen called a baluster back, parlour chair; and the student must observe, that in general, all modern chairs are constructed upon the principles of this example; that is, the back of the seat is narrower than its front; consequently the seat and general plan of the chair are trapeziums, of which two sides are parallel to each other, as a and b, Fig. 1 and 2; while the other two are inclined to each other, as c and d. By this form of the original object, it is absolutely necessary to find *three* vanishing points, for the delineation of the chair seat and rails; a fourth must also be employed to facilitate the operation.

The measures of the chair are as follows:

The height of the seat is 18 inches.

The width of the front of the seat, 25 inches.

The width of the back of the seat, 19 inches.

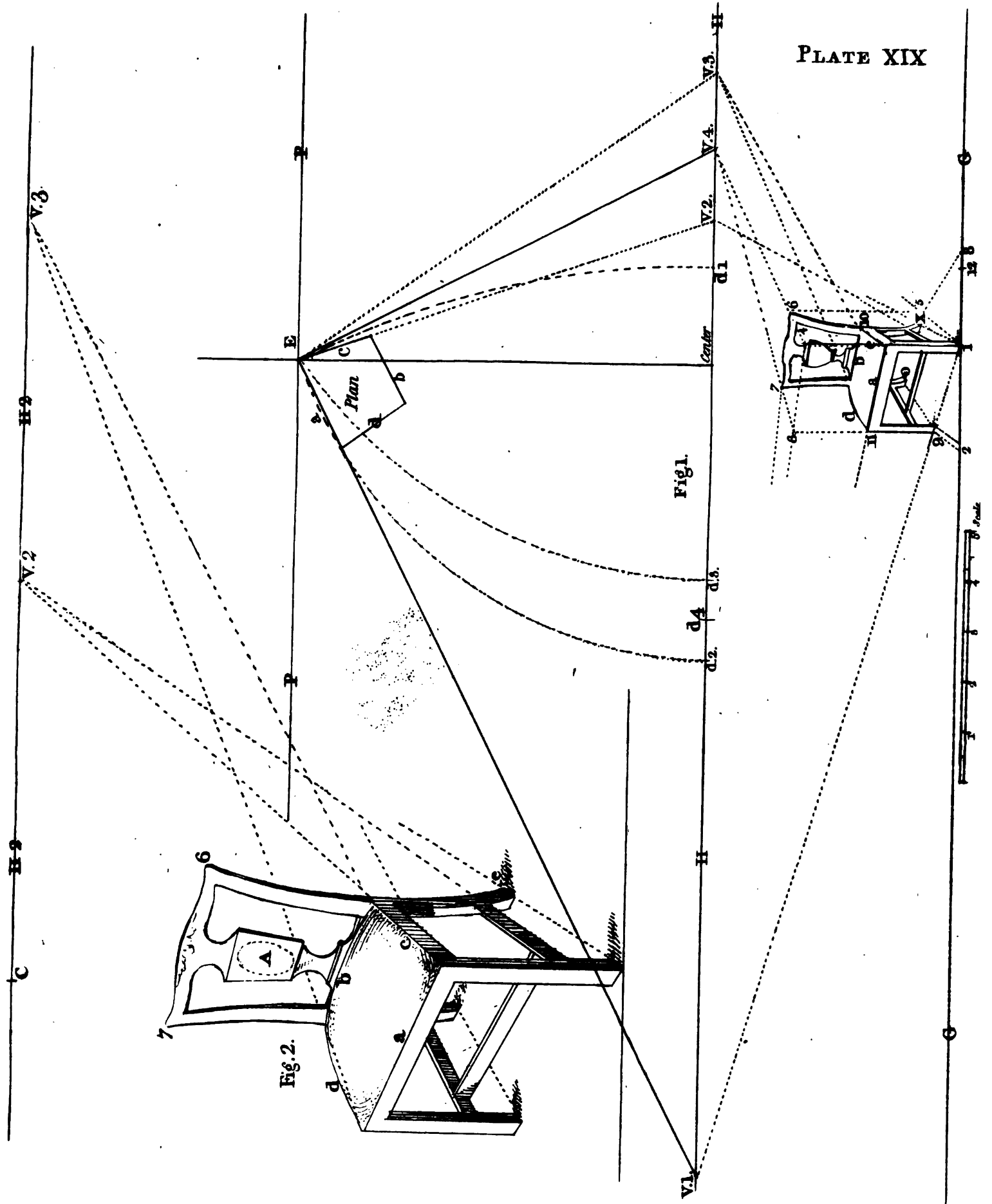
The depth of the seat from the front to the back, as from a to b, 19 inches.

The height of the back above the seat, 18 inches.

The width of the top of the back is the same with the front of the seat.

The







The height of the eye or horizontal line is 5 feet.

The distance of the picture is 8 feet 5 inches.

H H is the horizontal line, G G is the intersection or ground line, and the center of the picture is marked by the word center.

S E C T.  
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XIX.

*Process, Fig. 1.*

Determine the center of the picture, and likewise the distance or place of the eye, as E, and draw the parallel of the picture P P, as in the foregoing examples.

At the eye E draw the plan a b c d of the seat of the chair, by the scale; disposing the front a with the same inclination to the *parallel* of the picture P P, as the original is supposed or known to incline to the *picture*.

Continue the line a, which expresses the front, till it cut the horizontal line at V 1; the point V 1 will be the vanishing point for the front and back of the chair, for they are parallel to each other. Then continue the line c of the plan, till it intersects the horizontal line at V 2; then will V 2 be the vanishing point for the side c of the plan of the chair.

Through the point E draw another line parallel to the side d of the plan, till it intersect the horizontal line, as at V 3, and V 3 will be the vanishing point of the side d of the chair.

Thus are the three vanishing points obtained, V 1 for the front and back of the chair; V 2 for the side c, and V 3 for the side d.

Find the vanishing point V 4, by drawing a line at E perpendicular to the line E V 1, and its intersection at V 4 will be the vanishing point for lines perpendicular to the front of the chair.

After having determined these vanishing points, find their distances by the foregoing rules; as d 1 is the distance of V 1, d 2 the distance

tance

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XIX.

tance of V 2, d 3 the distance of V 3, and d 4 the distance of V 4.

Having thus obtained the vanishing points and their distances, proceed as follows :

Suppose the point 1, Fig. 1, in the ground line, to be the point at which the angle of one of the front legs touches the picture.

At 1 draw the perpendicular 1 c, and upon that line set up the height of the seat 18 inches by the scale; and from the bottom and top of the leg, that is from 1 and c, draw lines to the vanishing point V 1. Then on the base line set off from 1 to 2 the width of the front of the chair 2 feet 1 inch, and from 2 draw a line to d 1, which is the distance of the vanishing point V 1; and the intersection at g will be the apparent width of the front of the chair. Draw the front with the rail and breadth of the legs by the foregoing rules, as in the example of the table, Plate XIV. Page 114.

Then from the upper angles of the front draw the side d to the vanishing point V 3, and the side c to the vanishing point V 2.

This will be better understood by inspecting the large example Fig. 2; where the front and back, a and b, are both drawn to one \* vanishing point, they being both parallel to each other; while the side c is drawn to the point V 2, and the side d to the point V 3; because those sides incline to each other.

Determine the depth of the seat as follows :

The vanishing point of the side c of the chair seat, Fig. 1, is V 2. Therefore, from the angle 1 draw a line to V 2, and cut off a portion of that line equal the depth of the seat; for which purpose set the measure of the side d or c (being both equal in dimensions) upon the ground line, from 1 to 12, and from 12 draw a line to the point

\* The vanishing point for the front and back a and b, Fig. 2, are out of the plate, for want of space.

d 2, which will give the intersection x, and determine the apparent depth of the seat upon the ground; which measure must be transferred to the point 10, by a line drawn perpendicular to the horizon, which will produce the intersection 10.

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Having obtained the point 10, the representation of the seat of the chair is formed by drawing a line from that point to the vanishing point V 1; a portion of which line is b, which represents the back of the seat. Then find the representation of the back, as follows:

Continue upwards the angle of the nearest front leg, as from 1 to 4; and from the point 1 set up the whole height of the chair back, 3 feet 2 inches by the scale; and from the point 4 draw a line to the vanishing point V 1, which will intersect a line drawn upwards through the angle of the other front leg, in the point 3; then from the points 3 and 4 draw lines to the vanishing point V 4, and find the point 6, which is the upper angle of the back, as follows:

From the point 1 draw a line to the vanishing point V 4, and set upon the base line from 1 to 8 the measure of the depth of the back, by its \*inclination; and from the point 8 draw a line to d 4, which will give the intersection 5; from which point draw a line perpendicular to the horizon, to intersect the line drawn from the point 4 to the vanishing point V 4, as at 6; from which point draw a line to the vanishing point V 1, which will produce the intersection 7: then will the line b, which is the back edge of the seat of the chair, together

\* By inclination must be understood the bend or slope of the back; which, in the kind of chair represented by the example, declines backward from the seat; by which circumstance the top of the back is further from the front-rail a of the seat, than the back rail b.

The best way to obtain the measure of the depth of the inclination of the back, is to place the chair against the side of a room, and measure from the front of the seat to the wall. In the example, the difference is about  $3\frac{1}{2}$  inches; the depth of the seat being 19 inches, and spring of the back, or back feet,  $23\frac{1}{2}$  inches, expressed by the points 12 and 8 in the ground line G, Fig. 1.

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with

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with the points 6 and 7, be the principal guides for the delineation of the back of the chair; which, with the back feet, must be drawn by hand; for in all complex forms composed of curved lines, like the example here given, the rules of perspective can only give points of direction, by which the curves must be completed by hand.

In this example, many of the lines that are necessary for the completion of the object are omitted, as their number would appear so complex as to render the figure unintelligible; but the whole will be clearly understood, if those which are given are well examined, for they are the essential, and govern the rest.

The Student must pay particular attention to this figure, because it is the first of this Treatise in which the sides of the object are *not* at right angles with each other. But of this further notice will be taken hereafter. He must also observe, that the whole form of the object is contained in a parallelepiped, the angles of which are marked as follows: 1, x, 9, 0, considered as the base, and 3, 4, 6, 7, as the top.

This must ever be the process when objects are composed of curvilinear forms, such as the back and baluster marked A, Fig. 2, together with the back feet; for those parts must be drawn by hand, through points which determine the extreme angles, or principal parts of the required forms.

The Example, Fig. 2, is given to shew the object at large, more particularly to demonstrate the direction of the sides of the object to their vanishing points.

The horizontal line for this figure is marked H 2, and the vanishing points for the sides of the chair are V 2 and V 3, which correspond with the points V 2 and V 3 in Fig. 1.

The vanishing points for the front and back are beyond the limits of the plate, as before observed.

The

The thickness of the legs, the place and dimensions of the side rails, together with the stretcher, are determined by the same process, which was employed in the example of the Table; Plate XIV.

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The baluster A of the back must be drawn by hand; to assist which, find the perspective representation of the middle of the back of the chair, together with as many points as may serve as guides to direct the delineation of the smaller forms; after which the whole must be finished by hand, as already observed.

*Door inclined to the Picture.*

Plate XX.

Is an example for determining the apparent width of an open door, when inclined to the picture.

PLA.  
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This figure is intended to shew the process by which a door may be represented in true proportion to the aperture, after the other parts of the room are finished; and therefore may be considered as extremely useful to the artist, who wishes to represent an open door, the dimensions of which may correspond with a given aperture in any position suited with the composition of his picture.

Let it be supposed, that the sides of the room and the aperture for the door are already drawn, and \* that the lines R R, R R, represent the upper and lower lines of the sides of the apartment, and that the points V, W, mark the apparent width of the opening of the door—g is the vanishing point of the side C Y of the room, and d is the distance of that vanishing point. Observe that this point is in the shade, therefore rather obscure.

First find the real width of the aperture, by the inverse process, as follows;

\* In this problem it is assumed that the center and distance of the picture are already determined: C is the center, and E the eye or distance of the picture.

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Consider the width of the aperture of the door as a given portion of the line  $T W V$ , the vanishing point of which, as before observed, is  $g$ , and its distance  $d$ .

From  $d$ , draw right lines through  $W$  and  $V$ , till they cut the ground line  $G, G_1$ , at  $a$  and  $b$ : then will the space between  $a$  and  $b$  represent the real width of the aperture.

Having thus obtained the real width of the aperture, proceed as follows:

At the point  $V$ , which is in the line of the door upon which it is hinged, draw a right line at pleasure, as may best suit the circumstances required in the picture; and continue that line, till it cut or intersect both the ground line and the horizontal line, as the line  $V S$ , which intersects the ground line at the point  $m$ , and the horizontal line in the point  $o$ : consequently the line  $m S V o$  is the indefinite representation of the face of the door, and  $o$  is its vanishing point.

\* From  $o$  draw a line to the eye or distance  $E$ , and bring down the length of that line to the horizontal line, as at  $d_2$ , which will be the distance of the vanishing point  $o$ .

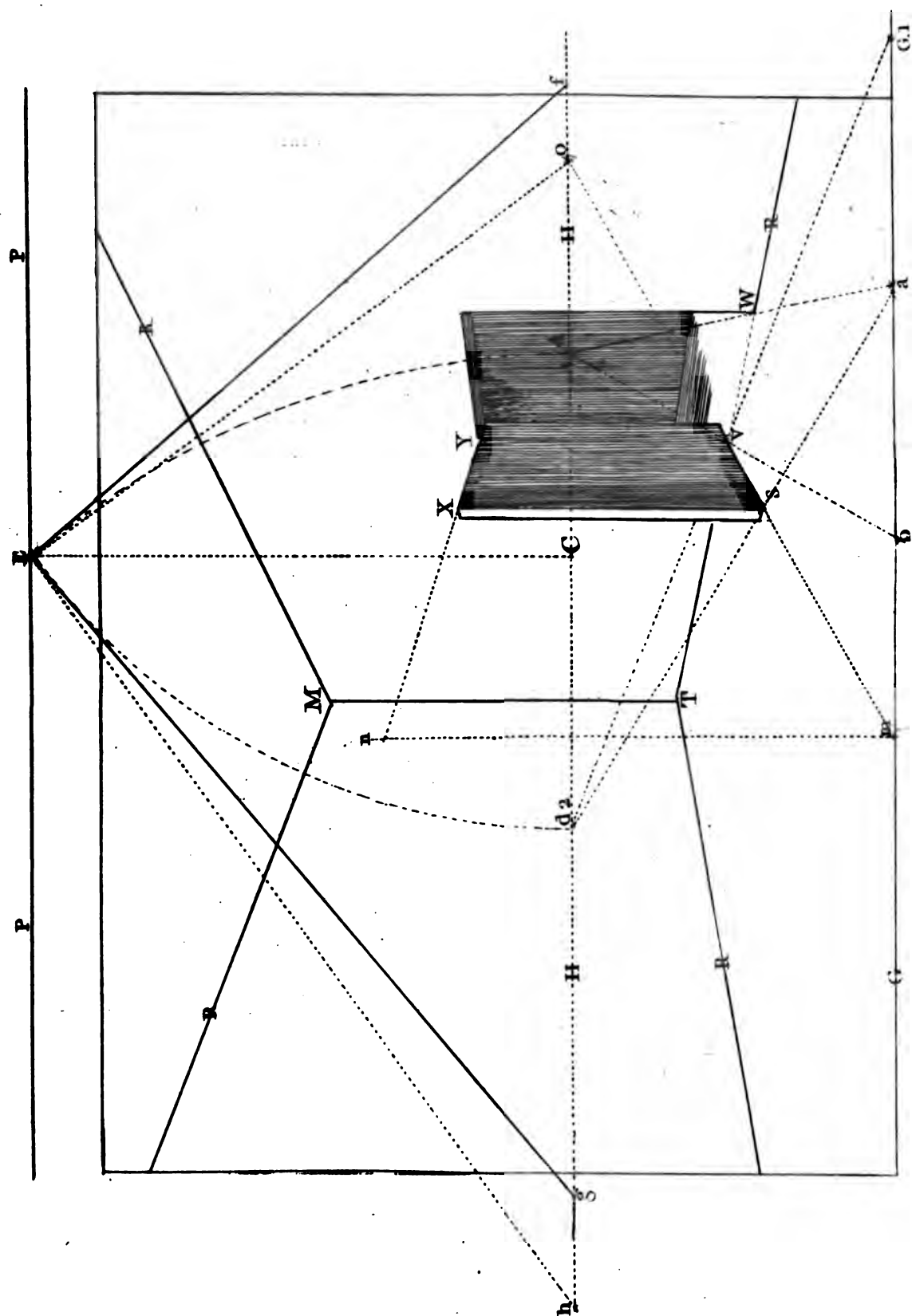
Thus is  $o$  the vanishing point of the lowest line of the face  $V X$  of the door, and  $d_2$  is its distance; therefore, from  $d_2$ , draw a right line through  $V$ , till it cut the ground line or intersection of the picture, as at  $G_1$ ; then take the width of the door, which has already been found at  $a b$ , and set it on from  $G_1$  to  $a$ ; and from  $a$  draw a right line to  $d_2$ ; and its intersection  $S$  with the line of the face of the door, which line is drawn from  $m$  to  $o$ , will give the apparent width of the door.

It is presumed that the student has already made such progress before he attempts this problem, that after having obtained the point

\* The line  $O E$  is the radial parallel to the original of face  $S X V$  of the door; and the length of every radial is the distance of the vanishing point produced by that radial; therefore  $d_2$  is the distance of the vanishing point  $o$ .

S, he







## P E R S P E C T I V E.

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S, he will be able to complete the representation of the door without further instructions; because, all that follows has been already explained. Therefore it will be sufficient to observe, that the vanishing point for the thickness of the door at S, is h, the intersection of its parallel radial with the picture: so that to find the true dimensions of the thickness of the door, the distance of the vanishing point h must be brought down to the horizontal line, the dimension of the thickness marked on the \* ground line. and transferred to the door, as before.

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In this example the process, which may be considered as the natural order of operation, is reversed; for instead of finding the points V W, by their places a b first given, on the ground line or intersection of the picture; the representation of the opening of the door, as V, W, are first given, or supposed, and afterwards their places found upon the intersection of the picture, as at b, a.

Again, the line S V of the face of the door being drawn at pleasure, as may best suit the design of the artist, the vanishing point of that line, and the distance of that vanishing point must afterwards be found. Therefore, instead of first drawing the radial E o, making the same angle with the parallel of the picture, which the door is required or known to make with the picture; the radial must be drawn from o to E, because o is the vanishing point already determined by the position of the line m S V. Here it will be proper to remark, that if nothing more were required than to cut off a portion of the line m S V, the radial o E need not be drawn; because the distance from o to E, taken by the compasses, is sufficient to determine the distance of the vanishing point o: but, as it is necessary to

\* The distance of the vanishing point h is not marked, and other lines are omitted, that the figure might not be too much confused.

The perpendicular dotted line m n is the line upon which the real height of the door is marked; which being transferred by the vanishing point o, marks the apparent height of the door at X.

end

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find the vanishing points for the thickness of the door, the line o E must be drawn, that the line E h may be drawn perpendicular to o E, thereby to obtain the vanishing point h, which is the vanishing point for the thickness of the door at S X.

As the instructions and observations given in this example may be considered as a scholium upon the preceding part of the Section, it will be very advantageous to the student to understand it clearly, and also to consider the following Corollary.

The line V Y is the line upon which the door is hinged; therefore, the point V, which is upon the Floor, may be considered as the center, round which the lower line S V of the door revolves, producing a circle, all the radii of which are equal to the *original* of the line S V. Hence it follows, that this problem may also be considered in effect the same with that which is given by Dr. Brook Taylor in his first edition, Prob. 12, Example 3, Page 24, which teaches to complete the representation of a circle from the representation of one given radius.

For suppose the line V W the given representation of a radius, and V the center of the required circle; then will the line V S represent a second radius; consequently, all the other radii may be determined by a repetition of the same process, by which the line V S was obtained; and as the circle passes through the extreme of its radii, the points S and W may be considered as two points in the perspective representation of the periphery of a circle, the rest of which remain to be found.

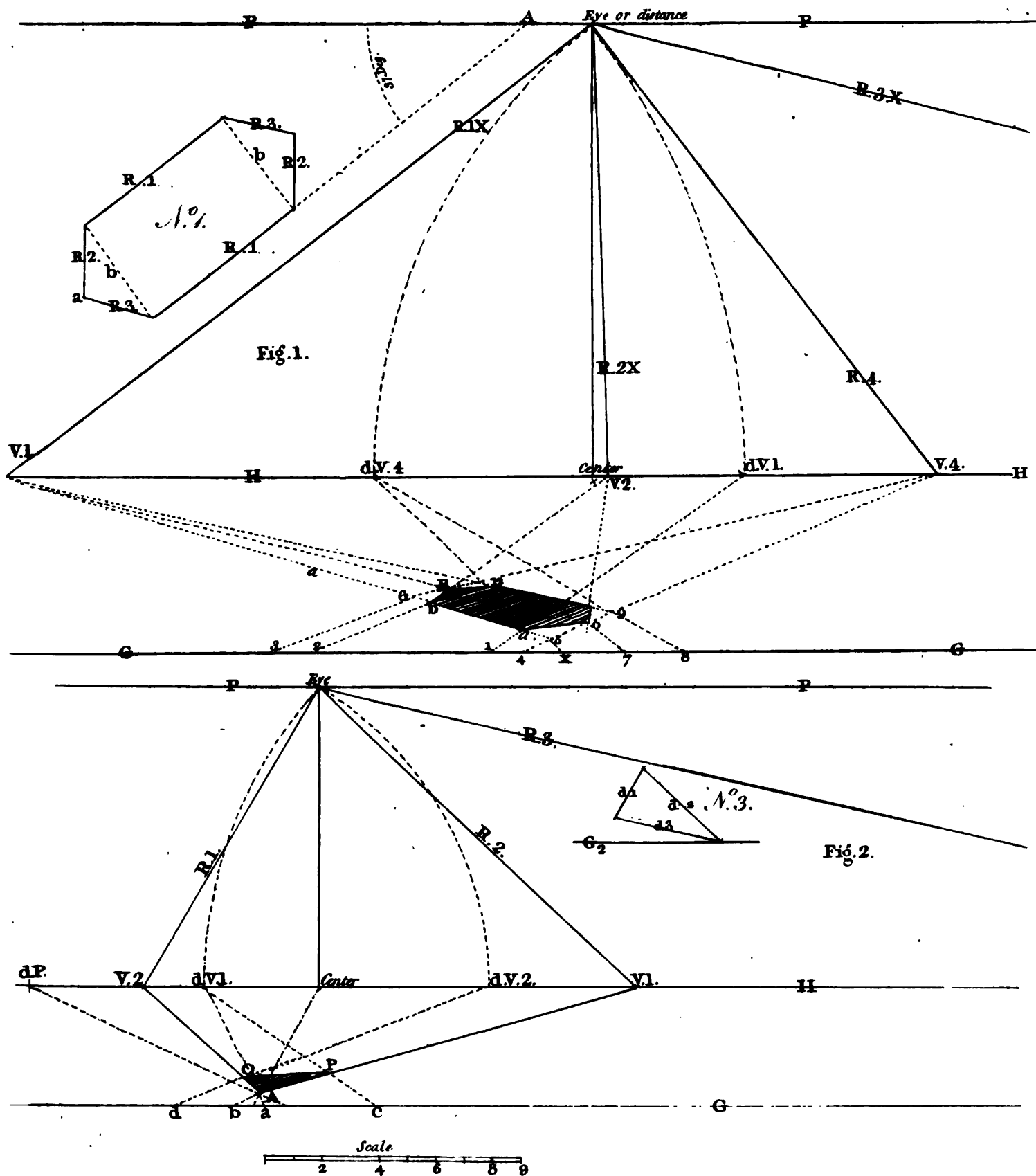
*Of the Polygon and Triangle.*

Plate XXI.

PLATE  
XXI.

In this plate are two examples, one of which may be called an oblong hexagon, the other a triangle, in perspective, both of which have all their sides inclined to the picture.

In





In drawing the perspective appearances of objects similar to these examples, the readiest way of finding their vanishing points, is to draw their geometrical forms in some part of the canvas or paper; disposing the sides with the same inclination to the parallel of the picture, as those of the original object.

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XXI.

Let the hexagon, Fig. 1, be supposed to be situated that one of its longest sides inclines to the picture in an angle of 37 degrees.

After having determined the center\* of the picture, and its distance, as at the words center and distance; draw the horizontal line H, and the parallel of the picture P P, as in the foregoing examples. This being done, draw the geometrical figure of the hexagon, No. 1, in such disposition, that the sides R 1, R 1, shall incline to the parallel of the picture P P, in an angle of 37 degrees, which is the inclination that the original object makes with the picture. Through the eye draw the radial R 1 X, parallel to the sides R 1, R 1, of the geometrical plan No. 1; and the point where that line intersects the horizon, as at V 1, will be the vanishing point for the projection of the representation of the lines R 1, R 1, in the geometrical plan, No. 1.

Again, through the eye draw the radial R 2 X, parallel to the original lines R 2, R 2, in the geometrical plan No. 1; and the intersection of the radial R 2 X with the horizontal line H, will be V 2, which will be the vanishing point for two of the sides of what may be called the ends of the hexagon.

The other radial R 3 X is drawn in the same manner through the eye, parallel to the sides R 3, R 3, of the geometrical figure No. 1, and would, if continued, cut the horizontal line, and produce a third vanishing point; but the angle of the radial R 3 being but little

\* The center of the picture is marked by the word, and the mark X; but V 2, close to it, is a vanishing point, produced by the radial R 2 X.

inclined

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inclined to the picture, its intersection with the horizontal line will not be in the paper; therefore, it is necessary to find\* the vanishing point V 4, which is for lines perpendicular to the *radial* R 1 X, or, which is the same thing, to lines perpendicular to the lines R 1, R 1, in the geometrical plan No. 1.

Having thus obtained the vanishing points V 1, V 2, V 4, and the distances d V 1, d V 4, proceed as follows:

Let the point *a* be found in the perspective representation, by the rules given in example, Fig. 2. Plate XI, page 99; from the point *a* draw a line to the vanishing point V 1, which line may be considered as the indefinite representation of that longest side of the hexagon which is nearest to the picture.

From the point d V 1, which is the distance of the vanishing point V 1, draw a right line through *a*, till it cuts the base line at 1; and then set off the measure of the side, as from 1 to 2, in the base line, which is equal to one of the longest sides of the hexagon, No. 1; and from 2 draw a right line to d V 1, which will intersect the line *a* b at b: consequently, the portion of line between *a* and b will be the perspective representation of that longest side of the hexagon which is nearest the picture.

Having thus obtained the nearest side of the hexagon, find the perspective representation of the oblong or parallelogram which contains the *whole figure*, as 5, 9, 6, 12.

For this purpose, on the geometrical figure, No. 1, draw the lines b, b, through the intersections which the shortest sides of the hexagon

\* In drawing this kind of figures, the great business of the artist is to contrive that they may be executed with the fewest vanishing points possible.

In this figure three vanishing points are employed, which are V 1, V 2, V 4.—But V 4 is not a vanishing point of any one of the sides of the figure, but is a vanishing point of lines at right angles with the sides R 1, of No. 1; for as the vanishing point of the sides R 3 would lie at a great distance beyond the limits of the paper, it is necessary to find some other point which may supply the want of it.

make



make with the longest. Then take the projection of the angle from *b* to *a*, No. 1, and apply that measure on the ground line *G G* from 2 to 3, and from 1 to 4; from which points draw lines to *d V* 1, and they will intersect the line *b a*, in the points 5 and 6; from which points draw lines to the vanishing point *V* 4. Having drawn these lines, find the breadth of the parallelogram: for which purpose draw a right line from *d V* 4 through the point 5, till it intersect the base line at *X*; and set off from *X* the whole breadth of the hexagon by two equal divisions, as at 7 and 8; and from those points draw right lines to *d v* 4, the distance of the vanishing point *v* 4; and they will produce the intersections 5, 9, 10; from which intersections draw lines to the vanishing point *V* 1, which will give the sides and also the longest diameter of the parallelogram which contains the hexagon.

Complete the hexagon, as follows—From the point *b*, \*draw a right line to the vanishing point *V* 4, and its intersection with the opposite side of the hexagon will give the point 12.

Draw right lines from *o* and *b*, to the vanishing point *V* 2, and join the points *a*, *o*, and 11, 12, by right lines; and the hexagon will be complete.

*Triangle inclined to the Picture.*

Plate XXI. Fig. 2, is an example of a triangle, the sides of which are inclined to the picture.

Having determined the center of the picture, with its distance, draw the horizontal line, and the parallel of the picture *P P*.

Then draw the triangle, No. 3, in any part of the paper or canvas, so that the sides may make the same inclination with the parallel of the picture *P P*, which the sides of the original is known to make with the picture.

\* This line is not marked, to avoid confusion.

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Through the eye draw lines parallel to the original lines  $d_1$ ,  $d_2$ ,  $d_3$ , in No. 3, which parallel lines will be  $R_1$ ,  $R_2$ ,  $R_3$ , producing the vanishing points  $V_1$ ,  $V_2$ : but the vanishing point which would be produced by  $R_3$ , falls beyond the limits of the paper, but is not required in this diagram.

Having found the vanishing points  $V_1$  and  $V_2$ , with their distances  $d v_1$ , and  $d v_2$ , determine the place of the angle  $A$ , as already directed in the foregoing example; the point  $d P$  being the distance of the picture, brought down to the horizontal line: then from the point  $A$  draw right lines to  $V_1$  and  $V_2$ , which will be the indefinite representation of two sides of the triangle.

Through the point  $A$ , draw right lines from  $d V_1$  and  $d V_2$ , which shall cut or intersect the ground line at  $a$  and  $b$ ; from which points set off the measures of the sides of the triangle, as from  $a$  to  $c$ , equal the side  $d_2$ , and from  $b$  to  $d$ , equal the side  $d_1$  in the geometrical triangle, No. 3.

From  $c$  draw a line to  $d V_1$ , which will intersect the line that is drawn from  $A$  to  $V_1$ , in the point  $P$ ; and from  $d$  draw a line to the point  $d V_2$ , which will intersect the line drawn from  $A$  to  $V_2$ , in the point  $O$ : consequently, the line  $A P$  represents the side of the triangle equal  $d_2$ , in the geometrical figure No. 3; and  $A O$  the side equal  $d_1$ , in the same geometrical figure. Complete the triangle by drawing the line  $O P$ .

It is almost needless to observe, that having obtained two sides of any triangle, the third is found of course; therefore two vanishing points are sufficient.

In all solid figures, of which the plans or bases are polygons or triangles, the elevations are constructed by the same vanishing points, which produce the plans: therefore, if the foregoing examples concerning solids, the sides of which are at right angles with each other,  
are

are well understood, there need no further instructions concerning the construction of buildings, the bases of which are polygons or trapeziums, for the same methods are employed in both cases. Thus, if a solid prism were required to be represented upon the triangle Fig. 2, nothing more is necessary than to draw lines at the different angles A O P, perpendicular to the horizon; then to determine the heights of the nearest vertical line in the object, and from the point so found drawing lines to the vanishing points of the sides; which points are V 1, and V 2.

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*Octagon and Pentagon, Plate XXII.*

Fig. 1, and Fig. 2, are examples for drawing the octagon and pentagon in perspective, when their sides are all inclined to the picture.

PLATE  
XXII.

Before any instructions are given for finding the vanishing points, it will be necessary to inform the student (particularly if unskilled in Geometry) of the readiest methods of drawing those forms geometrically\*.

The octagon being the simplest, shall be first given.

To draw a regular octagon in a *square* of any given dimensions, the following is the process:

Draw the square, Fig. 1, No. 1, of the given size; and at the points 1, 2, 3, 4, draw the diagonals A C, B D.

Then with a radius equal to half the diagonal, that is with compasses on the point C or D extended to E, which is the center of the square, draw the semicircles a d, g b, cutting the sides of the square at the points a c, and g b. Repeat the same at the angles A and B, producing the points e, h, and f, c; draw right lines from b to c, from a to e, from f to g, and h to a; and the octagon will be completed.

\* These problems do properly belong to the first section; but they are placed here, that the student might not have the trouble of turning back, before he could proceed with the perspective part of the diagrams.

**SECT.** For the regular pentagon, the sides of which are of given dimensions, the following are the methods of operation.

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Draw the line A B, Fig. 2. No. 1, equal to the given dimensions of one of the sides of the pentagon.

Upon the points A and B draw two circles, the radii of which are equal to the line A B, and they will intersect each other at the points a and b; through a and b draw a right line, as C D.

With the radius equal to the given line A B, on either of those points, mark the point a on the line C D; and upon that point describe the circle 1 2, A B, producing the point E.

Through the points 1 2 and E draw right lines, till they cut the upper circles in the points 3 and 4; on the points 3 and 4, with the radius A B describe the arcs D, and join the points A 3, B 4, D 3, and D 4, by right lines; and the pentagon will be complete.

Plate XXII. Fig. 1. Process for the perspective representation of the octagon, the sides of which are inclined to the picture.

Having drawn the horizontal line H H, and the parallel of the picture P P, as before directed; draw the radial E V 1, making the same inclination with the parallel of the picture P P, that the side of the original object makes with the picture.

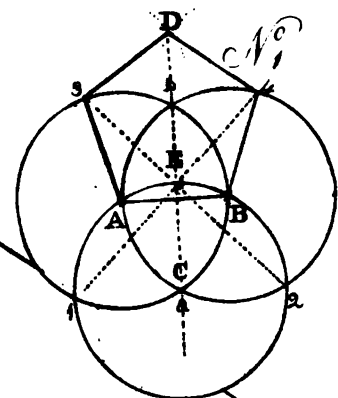
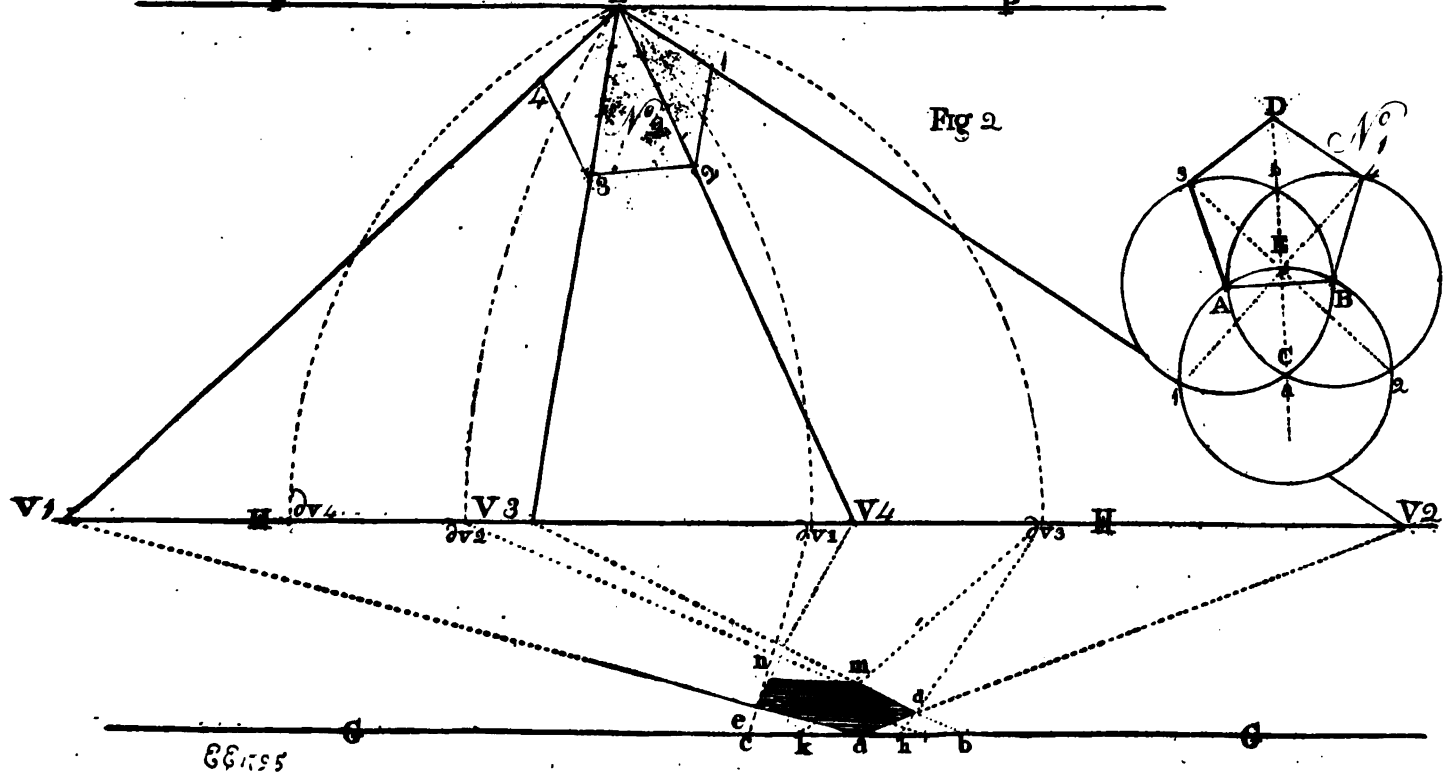
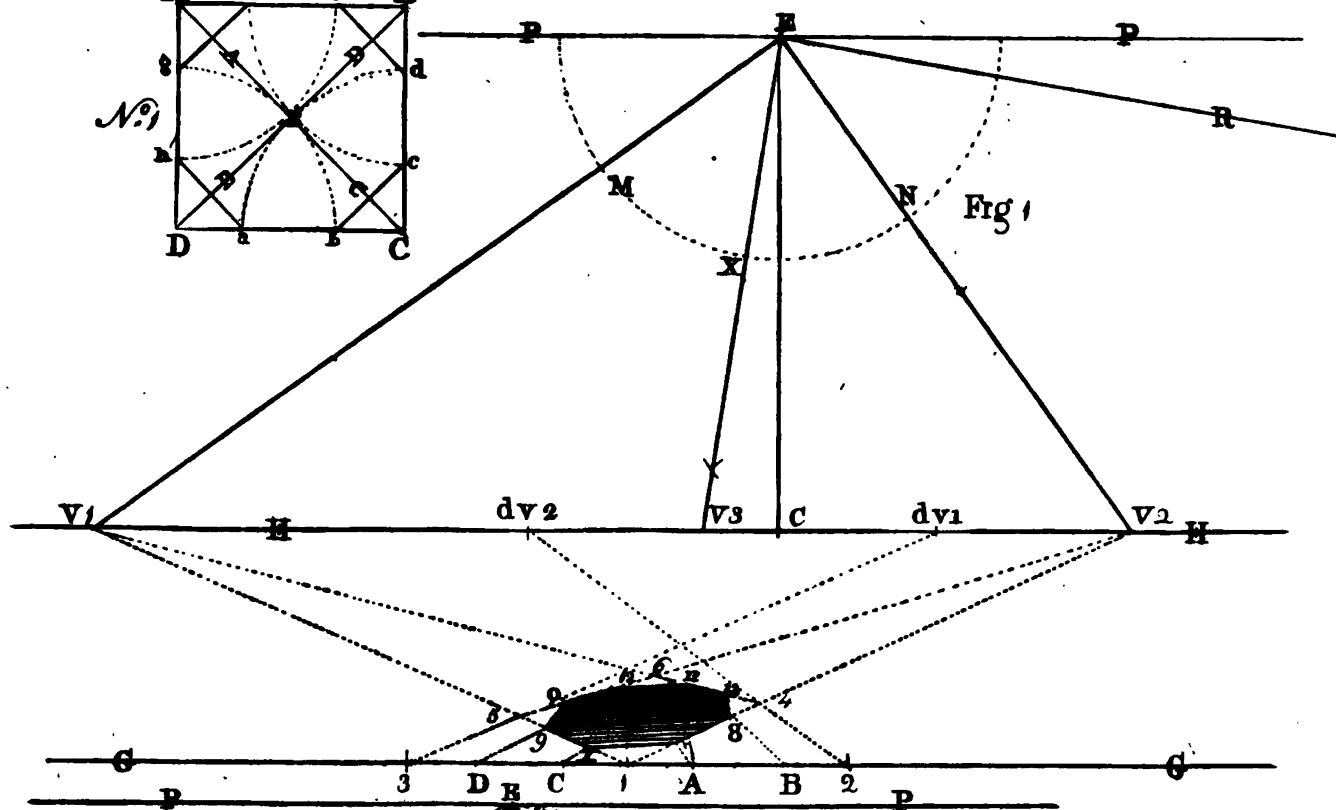
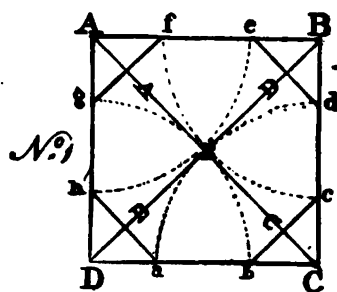
Thus the line E V 1, makes an angle of  $35^{\circ}$  with the parallel of the picture P P, and produces the vanishing point V 1.

Perpendicular to the line E V 1, draw the line E V 2, producing by its intersection with the horizontal line, the vanishing point V 2.

Bring down the distances of those vanishing points to the horizontal line, as at d V 1, and d V 2.

These points being determined, draw the perspective representation of the circumscribing square, as follows:

Let 1 be supposed the angle of the square, touching the intersection or base line of the picture G G. From 1 draw lines to the vanishing points





points V 1 and V 2, and set off on the base line the dimensions of the circumscribing square; that is, from 1, to 2 and 3 on each side, equal to the side A B or C D of the original geometrical square, No. 1.

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From those points draw lines to the distances of the vanishing points d v 1 and d v 2, and the intersections 4 and 5 will be the perspective appearances of the angles of the circumscribing square.

Complete the perspective square 1 4 5 6, by a line drawn from the point 4, to the vanishing point V 1, and from the point 5 to the vanishing point V 2.

Find the vanishing point V 3, of lines producing those sides of the octagon, which are parallel to the diagonals of the given circumscribing square, as b c, g f, and d e, h a, in Fig. 1, No. 1, as follows:

Bisect the angle M E N, and draw a right line from the eye E, through X, which by its intersection with the horizontal line, will give the vanishing point V 3, the vanishing point for one of the diagonals of the perspective square, Fig. 1, which circumscribes the representation of the octagon.

From the point 1 in the base line (which is the nearest angle of the circumscribing square) set off the measures which may determine the intersections of the sides of the octagon with that square, as follows:

From either of the angles of the square No. 1, as from C, take, with the compasses, the space c b, or C c, and apply that measure from the point 1 in the base line, Fig. 1, on each side, as to A and C; from A draw a right line to d V 2, and from C to d V 1, which will intersect the perspective square at the points 7 and X; also set the same measures from the points 2 to B, and from 3 to D.

From B draw a line to d v 2, and from D draw also a line to d v 1, which lines will produce the intersections 8 and 9.

Then from the points 8 and 9, draw lines to the vanishing point V 3, which lines will form the representations of two sides of the octagon as 8 1 1, and 9 o.

From

SECT. III. From the points 7 and X draw lines also to the vanishing point V 3, which will give the intersections 12 and 13. Join the points 7 and X, as also 12 and 13, by right lines, and the perspective appearance of the octagon will be completed\*.

Plate XXII.

It is needless to observe, that the sides x 7, and 11, 12, are parallel to each other, consequently, have the same vanishing point; which point would be produced by the radial R, if it were continued till it intersected the horizontal line; but as this point falls out of the limits of the paper, it cannot be conveniently employed.

*The Pentagon. Fig. 2, Plate XXII.*

Suppose the center of the picture C, with the eye or distance E, the horizon H H, and the parallel of the picture P E P, as before directed.

At the eye E, draw the regular pentagon No. 2, geometrically, with one of its sides at the same inclination to the parallel of the picture P E P, that the original inclines with the picture.

Continue the sides E 1 and E 4, till they intersect the horizontal line; also draw right lines from E through the angles 2 and 3, till they intersect the horizon; all which intersections will give the vanishing points V 1, V 2, V 3, and V 4, the vanishing points for four of the sides of the pentagon.

After having found those vanishing points, bring down their distances, as d v 1, d v 2, &c.

Let a in the ground line G G, be supposed the angle of the pentagon, which touches the picture. From a, draw lines to V 1, and V 2,

\* When a regular octagon is so situated that one of its sides is parallel to the picture, there will be no occasion for any other vanishing points than the center and distance of the picture, as commonly employed in the second section: for in such a situation, the sides of the octagon, which are inclined to the picture, may be considered as parallels to the diagonals of a circumscribing square; consequently, are inclined to the picture in an angle of 45 degrees. Therefore, the points of distance placed on the horizontal line will be the vanishing points of those sides of the octagon, which are inclined to the picture.

which



which will be the indefinite representations of two sides of the pentagon. From the point a, set off on the ground line the length of one side, as from a to b, equal A B or A 3 in the geometrical figure No. 2, and draw a line from b to d v 2; and the intersection d will give the apparent length of one of the sides of the pentagon, as from a to d.

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Repeat the same process from a to c equal the measure of a side, and from c draw a line to d v 1, which will give the intersection e, and determine a second side of the figure: from d draw a line to the vanishing point v 3, and from e to v 4, which will produce the indefinite representation of two other sides of the pentagon.

Then determine the length of those sides, as follows:

Draw a right line from d v 3, through d, till it intersects the ground line, as at h; and from h set off the length of a side to k, and draw a right line from k to d v 3; and its intersection m will give the length of the side d m.

For the side e n, repeat the same process, by means of the vanishing point v 4.

Having obtained the points m, n, join them by a right line, which will form the fifth side, and complete the pentagon.

In the foregoing problems, it is directed to draw the form of the required polygon at the eye or distance; but it must be observed, that the representation may be obtained, if the radial of one side only is drawn in the given inclination to the picture; after which lines must be drawn at the eye, making angles with the first given line, similar to those which are produced by the intersections of the different sides of the polygon with each other; which lines will produce the vanishing points, by their intersections with the horizontal line. But this process, though elegant and scientific, is not so ready and useful to the artist as the one here given. But should any one desire to pursue this part of the subject, he will find it amply treated by Hamilton and the Malton: the latter in his first volume, Book iii. Plate XIII.

As.

S.E.C.T.

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As edifices are very seldom constructed upon the plan of any polygon, except that of the octagon, the foregoing instructions will be sufficient for the artist in all cases whatever, for the vanishing points of the sides, as also the dimensions of those sides are all determined by the same process which is employed in the four preceding examples.

*Of Circles and Semicircles in Perspective, Plate XXIII.*

As it may be presumed that the student has already made himself master of the rules, by which the vanishing points of *horizontal* lines inclined to the picture are found; no directions are given for that part of the process in the succeeding examples of this Section, but the center of the picture and vanishing points are indicated, as already determined. For it must be evident to the slightest observation, that the lines which are called the parallel of the picture, and the parallel of the eye, are of no use after the vanishing points are found; therefore, those lines are omitted in the following examples, to prevent the confusion which would otherwise necessarily result from their number.

In the following examples and instructions, the application of circles and semicircles in the representations of columns and arcades is shewn, particularly when they are inclined to the picture.

In a foregoing lesson, Plate XV, Page 122, the manner of obtaining the representation of a circle was shewn; which was done by reticulating the geometrical figure by a number of right lines, and afterwards throwing that reticulation into perspective: which method is very easily understood, and is perhaps the best when the circle to be represented is large; but when required of moderate size, it will be more convenient to employ fewer lines; at most, no more than will produce by their intersections eight given points, as in Plate XXIII. Fig. 2; which figure is obtained by the following process:

First,

First draw the circle, No. 2, at full size; after which inclose it in a \*square.

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XXIII.

At the angles of the square draw the diagonals a c, b d, and through the center draw the diameters 2, 8, and 5, 7, parallel to the sides of the square; which diagonals and diameters intersect the circle in the points 2, 8, 5, 7, and a, b, c, d, producing eight regularly disposed points in the periphery of the circle.

Parallel to either diameter, draw two right lines, that may pass through the points, in which the circle is intersected by the diagonals, as the lines 1 d, 3 c.

It must be observed, that it is indifferent to which diameter these lines are parallel; because they are only required to indicate the seat of the points a, b, and c, d, upon one side of the square, as the points 1, and 3, which would be just as convenient in operation, if they were upon the base of the square, as upon the side.

Having thus completed the geometrical figure, No. 2, proceed to the perspective representation at No. 3.

The line G G is the base or ground line; and the line H H is the vanishing line of the plane in which the circle is situated, or, in other words, it is the horizontal line.

V 1 and V 2 are the vanishing points of the sides of the square; and d v 1, d v 2 are the distances of those vanishing points. V 3 is the vanishing point for the diagonal of the square a c; which may or may not be employed by the artist, as he shall find convenient.

Determine the appearance of the square, No. 3, in perspective; which is done by applying the measures equal to those of the geometrical square, No. 2, on each side of the point 4, upon the base line; as to 5 and 6; and then determine the square as in the former lessons;

\* Euc. B. iv. Prop. 7.

**SECT. III.** by lines drawn to the vanishing points, and to the distances of those vanishing points, as in the first lesson of this section, Page 97.

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After the representation of the square is obtained, draw the diagonals a c, b d; which must be drawn through the points or angles of the square.

At the point X, where those diagonals intersect each other, draw right lines from the vanishing points V 1 and V 2 through that intersection, and those lines will represent diameters of the circle, touching the square in the points 2, 7, 8, 9.

Having thus prepared the representation of the square, No. 3, with the diagonals and diameters; find the points a, b, c, d, in those diagonals, which may indicate four points in the periphery of the ellipsis; which is to be the representation of the circle required.

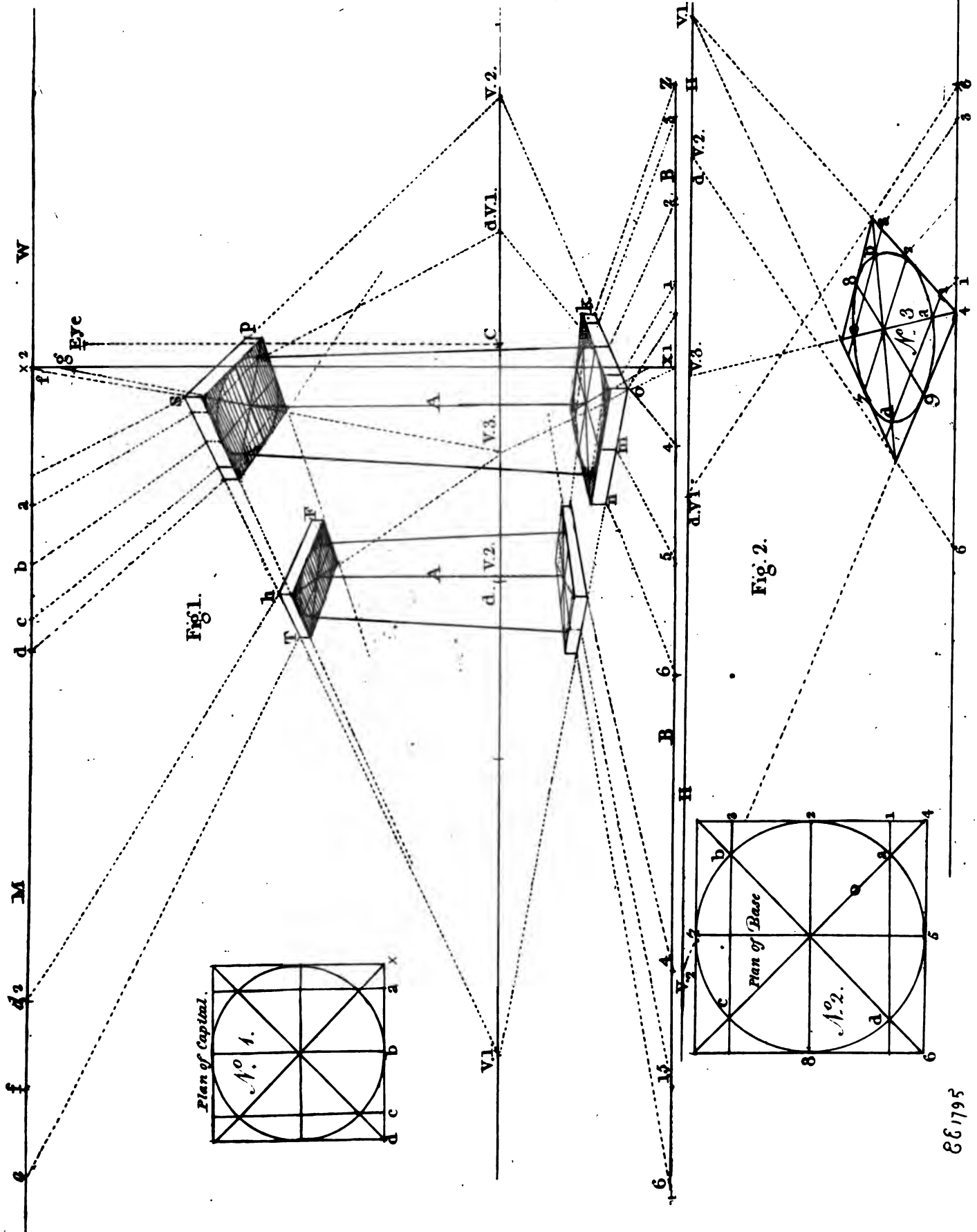
For this purpose the following process must be employed:

At the angle 4 of the representation of the square, set upon the base line the space 4 1, equal 4 1 in the geometrical square No. 2; and from 5 to 3 the same space; and transfer those points to the representation of the side of the square, as at the points 1 and 3, by the *distance* of the vanishing point d v 1; and from 1 and 3 draw lines to the vanishing point V 2, and those lines will intersect the diagonals in the points a, d, b, c; which are the points required. Through those four points, and the points 2, 7, 8, 9, making eight points, draw the representation of the circle by hand, in the best manner possible.

It must be observed, that the method here given, together with that of the Example in Plate XV, are the best adapted for the use of the artist: but of the two the latter is the most elegant.

There is also a method, which is extremely elegant, given by Dr. Brook Taylor, in page 24 of the first edition of his Linear Perspective: but his diagram, Fig. 22, is not sufficiently clear, nor is the process adapted to the painter's use.

*Of*





*Of the Shafts of Columns.*

Plate XXIII.

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The foregoing diagrams being clearly understood, the student may proceed to the following lesson, which shews the manner of representing the shafts of columns when standing in a row.

Fig. 1, represents the rudiments of two columns; the centers of which are in a right line, the vanishing point of which is V 1.

The other vanishing point is V 2; for as the plinth and abacus of every column are perfect squares, so the vanishing points of their sides are the vanishing points of lines at right angles with each other.

Therefore V 1 is the vanishing point for the fronts, and V 2 the vanishing point for all the sides of the plinths; and as every abacus is parallel to the plinth, so V 1 and V 2 are the vanishing points for the fronts and sides of those abaci.

The line B B is the base line.

H H is the horizontal line.

C is the center of the picture.

And the eye is marked by the word.

V 3 is the vanishing point of one of the diagonals of each of the plinths, as also for one diagonal in each of the abaci.

Let o be supposed the seat upon the *ground* of the nearest angle of the plinth of the first column, and let the line X 1, X 2, be considered as the intersection of the picture by a plane passing through the diagonal of the plinth and abacus of the nearest column; therefore, it will be the line upon which the height of the column must be determined.

From the point o draw a right line to V 1, which line will express the indefinite representation of the *fronts* of all the plinths that may

X 2

be

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be required; from o draw also a right line to V 2, which will produce the indefinite representation of the *side* of the nearest plinth.

Then determine the apparent breadths of those plinths as follows:

From the point d v 1, which is the distance of the vanishing point V 1, draw a right line through o, till it intersects the base line of the picture, as at 4; and repeat the same process from d v 2, which will give the intersection A.

From those two points determine the forms of all the plinths that may be required, as follows:

Upon a separate paper, or remote part of the picture, draw two circles, the diameters of which shall be equal to the lower and upper diameters of the shafts of the intended columns, as at No. 1 and No. 2; and circumscribe those circles each with a square, and draw the diagonals and ordinates, as was done in the case of the circle Plate XXII. page 153.

Then take with the compasses the dimensions of the lower diameter of the shaft, equal to the line from 4 to 6 in No. 2, and apply it upon the base line B, Fig. 1, from the point 4 to the point 6, and also the same measure from A to the point Z.

From the point 6 draw a right line to the point d v 1, which is the distance of the vanishing point V 1; and its intersection of the line which is drawn from o to V 1, as at n, will give the apparent breadth of the front of the plinth of the first column.

Then from the point Z draw a right line to the point d v 2, which is the distance of the vanishing point V 2; and its intersection with the line that is drawn from the point o of the plinth to the point V 2, will determine the depth of the plinth of the same column, as at k.

Then set up the height of the plinth upon the line X 1, X 2; and transfer that height by the vanishing point V 3 of the diagonal,  
as



as has been already taught in the example of the steps, Plate XVI. Page 125, and complete the form of the plinth.

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Then upon its upper surface find the representation of a circle, the diameter of which shall be equal to the diameter of the lowest part of the shaft of the required column; which must be done by the same process which was employed to obtain the representation of the circle, Plate XXII.

*N. B.* The diameters are found by means of the points 2 and 5 in the base line; from which points lines are drawn to the points *d v 1* and *d v 2*, as before directed; and the ordinates which determine the intersections of the circle by the diagonal of the square, are found by means of the points 1 and 3 in the base line, by the same process with the former.

Then determine the height of the nearest column, and also the representation of its abacus; as follows:

The line *X 1, X 2*, as before observed, is the intersection of the picture by a diagonal plane, supposed to pass through the angles of the plinth and abacus of the nearest column. Therefore, upon that line set up the whole height of the column, as from *X 1* to *X 2*; and at *X 2* draw the right line *M W*, parallel to the horizontal line.

Then from the point *X 2* draw a right line to the diagonal vanishing point *V 3*; and in that line find the point *S*, the nearest angle of the abacus of the nearest column.

But here it will be necessary to observe, particularly to those who do not understand architecture, that the perspective arrangement of columns in rows must be conducted by the distance between their centers or axes, rather than between their shafts; which distances must be determined as follows:

The points 4 and 6, as also 14 and 16, in the base line *B*, Fig. 1, mark the breadths of the plinths of the two columns; and the points

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points 5 and 15 mark the middle of those plinths: and as it is necessary to find the middle of the abaci of both columns, the points 5 and 15 in the base line B, must be transferred to the line M W, as the points b f, which stand exactly over the points 5 and 15.

These points may be obtained by drawing lines perpendicular to the horizon, from the points 5 and 15 in the base line, till they intersect the line M W in the points b and f; or they may be obtained by the following process:

Take with the compasses, the space between the points X 1 and 5, in the base line, and set it on upon the line M W, from the point X 2 to b; and also from b, set on to f the dimensions, equal to the space from 5 to 15 in the base line B; which last measure is equal to the distance between the centers or axes of the columns.

Then find the representation of the abacus of the nearest column, as follows:

From the plan of the capital, No. 1, take with the compasses half the dimensions of either of its sides, as from b to d, or from b to X; and apply that measure upon the line M W, from the point b, each way, as to d and P, and from the point P draw a line to the point d v 1; and its intersection with the line that is drawn from X 2, to the diagonal vanishing point V 3, will determine the angle of the abacus of the nearest column, as at S. Then from the point S draw a right line to the vanishing point V 1, as the line S T; which line may be considered as the indefinite representation of the upper edges of the fronts of the abaci for all the columns that may be required.

Then determine the representation of the abacus of the second column.

At the point b, in the line M W, set off half the breadth of the abacus each way to a and d; and from a and d draw right lines to the point

point  $d v 1$ , which will produce the interfections  $T$  and  $h$  in the line  $S V 1$ ; which points determine the apparent breadth of the abacus of the farthest column.

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. Then determine the side of each abacus, for which purpose proceed as follows :

Through the point  $S$ , which is the angle of the nearest, draw a right line from the point  $d v 2$ , which is the distance of the vanishing point  $V 2$ , that may intersect the line  $M W$ , as at the point  $k$ ; and from the point  $k$ , set on to  $m$  the depth of the abacus, equal to the space between  $d$  and  $X$  in the plan No. 1; and from  $m$  draw a right line to  $d v 2$ , which will give the interfection  $P$ , in the line  $S v 2$ : consequently, the space  $S P$ , is the apparent depth of the nearest abacus.

After what has been taught in the former part of this section, it is unnecessary to continue instructions for obtaining the representation of the abacus of the second column; it will be sufficient to observe, that a right line drawn from the angle  $P$  to the vanishing point  $V 1$  will determine the apparent breadth of the second abacus, as at  $F$ , and of as many more as might be required.

After having obtained the representations of the plinths and abaci, find the ellipses or representations of circles: one upon the upper surface of each plinth, and also one on the under surface of each abacus. And by the assistance of those ellipses describe the shafts of the columns, as follows :

From the points which represent the centers of the ellipses in the plinths, draw right lines to the centers of the ellipses in the abaci, as the lines  $A A$ ; which lines will represent the axes of the columns.

Then observe where the ellipses on the plinths are intersected by the diagonals that are *least inclined to the picture*; and from those points draw right lines to the points in the abaci, in which the upper ellipse is intersected by the diagonal that is nearest to parallel with

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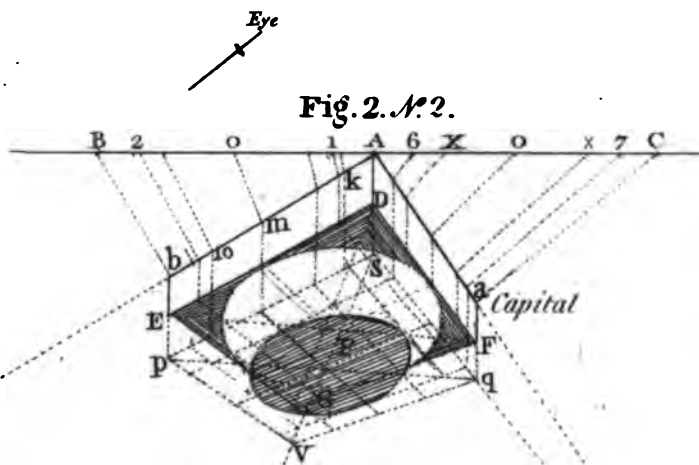
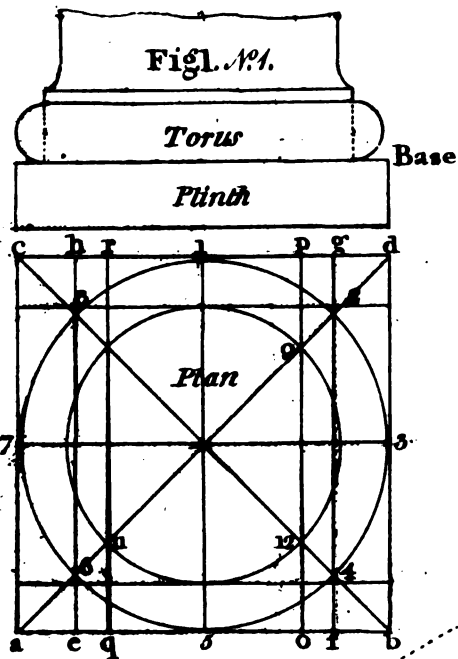
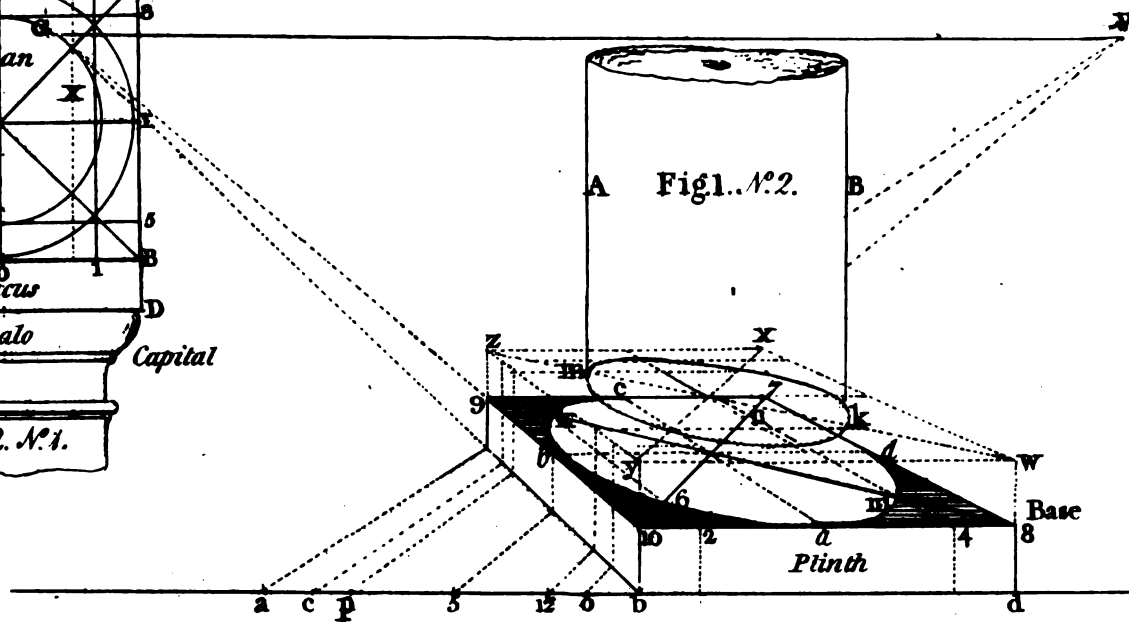
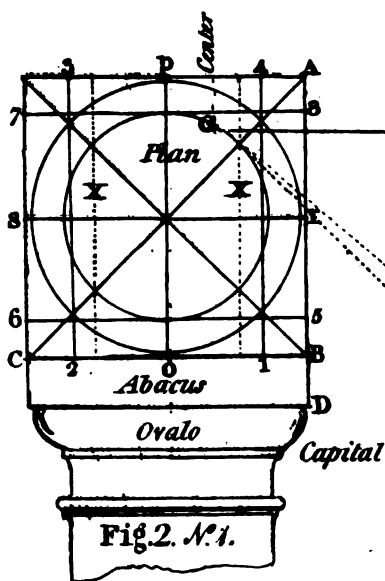
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with the picture: and those lines which in the example are marked y y, will be the apparent boundaries of the shaft; which will have the full effect, if shadowed with skill.

Observe, that the line A, which indicates the axis of the column, is of use to direct the artist in drawing the lines y y, which express the outlines of the shafts; for the latter lines must incline equally on both sides to the line A, which represents the axis of the column.

In re-considering this example, the student must observe, that the chief purpose of the foregoing operation is to obtain the representation of two circles, in two planes parallel to each other; which planes are the upper surface of the plinth, and the under surface of the abacus. These circles represent the lower and upper extremes of the shaft of the column; consequently, both those circles, though of different dimensions in their diameters, must have both their centers in one right line; which right line is the axis of the shaft of the column. And it must be particularly noticed, that the measures which determine the lower diameters and the intercolumnations, must be arranged by first finding the representations of the seats upon the ground of those centers or axes; which must ever be at equal distances from each other, both at their lower and upper extremes; while the space between each abacus is greater than that between each plinth: therefore, when the point s, in the base line, is determined, the point b, in the line M W, must stand exactly over it, and those two points must govern all the rest in the disposition of the columns.

It cannot be improper to observe, that the foregoing instructions direct a process which the author considers as attended with the least trouble, and as being the most convenient for the artist; because it does not require a plan to be drawn out upon the ground plane: a method which is always inconvenient, and frequently impracticable  
to



v.2. d.v.2. v.3. d.v.1. v.2.



to the painter. It must also be noticed, that the proportions employed in the example do not accord with those given by *Vignola* and other architects, but are more conformable to the ancient columns of Pæstum, which were purposely selected that the example might be more explicit, as the process must ever be the same, whether the height of the column consist of ten, or only of four diameters, provided the shaft be conical.

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*The Tuscan Base and Capital\*.*

Plate XXIV.

Fig. 1, No. 2, is for the base, when the plinth is disposed with its sides parallel, and perpendicular to the picture.

In drawing objects like the given examples, it will be the shortest process to draw the geometrical elevations, and also the plans of the parts, as in Fig. 1, No. 1, which represents the Tuscan base with its plan beneath.

Having drawn these at their proper dimensions (which may be done upon any separate paper) draw upon the plan the diagonals a d, and b c; after which draw the ordinates or right lines f g, e h, passing through the points where the diagonals intersect the circle of the torus, as at 2, 4, 6, 8.

Again draw the right lines o p, and q r, which must pass through the small circle, in the points where it is intersected by the diagonals. Draw the diameters 1 5, 3 7, and the lines 2 8 and 4 6, which are tangents to the small circle, ascertaining its dimensions or breadth.

\* Of the examples, one is parallel to the picture, and the other oblique or inclined: and to those who have studied the former part of this section, there can be no difficulty in the 2d figure, for it is evident that the process for describing the parts is the same in both figures; observing that in the first the center and distance of the picture are the points employed; whereas in the second oblique vanishing points and their distances are used.

Y

The

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The geometrical elevation of the base, together with its plan, being thus prepared, let the line  $a b d$ , Fig. 1, No. 2, be considered as the base line,  $C$  the center of the picture, and  $V$  the distance.— $d b$  is the breadth of the plinth, which being always square, set off the same breadth from  $b$  to  $a$ , and determine the perspective appearance of its form, by the rules given in the second Section.

Having completed the plinth, upon its upper surface draw the diagonals, as from the angle 8 to 9, and from 10 to 7.

Then intersect those diagonals by lines corresponding with the lines  $f g$ ,  $e h$ , in the plan Fig. 1, No. 1; which must be done as follows:

From the angles 10 and 8 of the plinth, Fig. 1, No. 2, mark the points 2 and 4, equal to the spaces from  $b$  to  $f$  and  $a$  to  $e$ , in Fig. 1, No. 1; and from the points 2 and 4 draw lines to the center of the picture  $C$ ; and those lines will intersect the diagonal lines in the points 6,  $k$ , and  $m$ ,  $n$ .

Divide the upper line of the plinth at the point  $a$  in half, and perspective on the receding side at  $b$ , and draw the diameters  $b d$  and  $a c$ . By which process eight points will be obtained upon the surface of the plinth, which will serve as guides for the delineation of the ellipsis, which includes the general form of the perspective appearance of the seat of the *Torus*.

After having drawn the lower ellipsis, proceed to form the upper one, which constitutes the lower part of the shaft of the column.

It must be observed, that in this example the torus and the listel united, are equal in their heights to the height of the plinth; consequently, they may be contained in a square of equal thickness with that which forms the plinth.

Therefore draw the upper square perspective, as expressed, by  
the



the upper lines w, X, y, Z; and upon its upper surface describe the ellipsis, which forms the lower part of the shaft of the column, as at k m.

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It is not necessary to give further instructions for finding the upper ellipsis \*, as it is sufficient to observe, that the same process, which was employed to describe the lower, must be repeated to produce the upper; and all that can be done by the rules of perspective, is to find as many ellipses as will assist the artist in drawing the members of the base by hand, whether their numbers be equal or more than are contained in the given example. It must be observed, that when the upper ellipsis is determined, the lines which mark the shaft of the column, as the lines A and B, must be drawn perpendicular to the horizontal line, from the points k, m, in the diagonal line W Z †.

Fig. 2, No. 2, is an example for the Tuscan capital, *inclined to the picture*.

Fig. 2, No. 1, is the geometrical elevation and plan of the capital, which, as in the foregoing example, must be so drawn before the perspective representation can be attempted.

In the plan Fig. 2, No. 1, the outer circle is the extreme of the ovalo, and the inner circle G G ‡ the dimensions of the shaft at the neck of the column.

\* The letters o and q in the base line Fig. 1, No. 2, correspond with the letters o, q: in the base of the plan, they mark the dimensions of the upper ellipsis.

† The examples here given are of the Tuscan base and capital, which are composed of few members, abstracted from the plinth, while the other orders are composed of many: but as all their members are disposed parallel to each other, they can only be determined by the representations of a greater number of parallel circles, the largest of which, upon the upper surface of the plinth, should represent the extreme dimensions of the torus, and the smallest, the thickest and lowest part of the shaft. In the capital, the largest circle should represent the upper part of the ovalo, and the least circle the highest and smallest part of the shaft, just above the astragal.

‡ The lines for the listel and the astragal are omitted, both in the plan Fig. 2, No. 1, and also in Fig. 2, No. 2, to prevent a confusion of lines in the example.

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The geometrical plan and elevation being drawn, let the line  $V_1$ ,  $V_2$ , Fig. 2, No. 2, be the horizontal line, and the points  $V_1$ ,  $V_2$ , the vanishing points for the inclined sides of the abacus, and  $d v_1$ ,  $d v_2$ , the distances of those vanishing points.  $V_3$  is the vanishing point for the diagonal.

The point  $A$  is the angle of the abacus, touching the picture: therefore at  $A$  draw the right line  $A B C$  parallel to the horizontal line.

From  $A$  draw lines to the vanishing points  $V_1$ ,  $V_2$ , which will be the indefinite representations of the upper edges of the abacus.

Upon the line  $B C$  set off from the point  $A$  the lengths  $B$  and  $C$  of the inclined faces of the abacus, equal  $B C$  in Fig. 2, No. 2; and draw lines to  $d V_1$  and  $d V_2$ , the distances of the vanishing points; which lines will produce the interfections  $a$ ,  $b$ , the upper angles of the abacus.

The thickness of the abacus is  $A D$ , equal  $B D$  in Fig. 2, No. 2; from which dimensions complete the representations of the abacus, by the methods which are given in the preceding instructions.

Then proceed to find the representation of the circle, which expresses the upper part of the ovalo, upon the abacus.

Observe, that the right lines  $1 4$ ,  $2 3$ , Fig. 2, No. 1, are ordinates passing through the points where the circle of the ovalo is interfect by the diagonals, and  $o p$ ,  $r s$ , are the diameters marking the extent of the ovalo upon the abacus.

Therefore, upon the line  $B A C$ , Fig. 2, No. 2, set the measures of the spaces  $1$ ,  $0$ ,  $2$ , from  $A$ , either way equal  $1$ ,  $0$ ,  $2$ , in the lower line of the plan, Fig. 2, No. 1; at the points  $D$ ,  $E$ , and  $F$ , draw the diagonals of the under surface of the abacus, as the lines  $D G$  and  $E F$ .

From the points  $1$ ,  $0$ ,  $2$ , Fig. 2, No. 2, draw lines to the distance of the vanishing point  $d V_1$ , and they will interfect the abacus at the points  $k$ ,  $m$ ,  $n$ ; which points must be transferred to the lower line of the abacus; and from those points draw lines to the vanishing point  $V_2$ , which lines will represent two ordinates interfecting the diagonals

diagonals and also the edges of the abacus, producing points through which the ellipsis must be drawn, which serves as a guide for the representation of the upper part or periphery of the ovalo, which must be drawn by hand.

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After having obtained the representation of the large or upper circle which represents the ovalo, find the representation of the small one, which is equal to the diameter of the neck of the column.

For this purpose observe, that the lines 5 6 and 7 8 in the plan Fig. 2, No. 1, mark the dimensions of the full extent of the small circle; and the dotted lines X, X, are the \*ordinates which mark the points in which the diagonals are intersected by the same circle, which, as before observed, is the upper diameter of the shaft.

Therefore, below the square of the abacus A D, Fig. 2, No. 2, construct the representation of another square P q S V, equal in thickness to the height of the ovalo and listel in the geometrical capital Fig. 2, No. 1; and upon the under part of that square produce the representation F of the circle, which indicates the upper diameter of the shaft; which representation must be obtained by the same methods which were employed for the delineation of the greater ellipsis or perspective appearance of the upper periphery of the ovalo of the capital.

When these two ellipses are obtained, they must be considered as the boundaries of the ovalo and listel of the capital, and consequently the guides to direct the artist in completing the delineation of the capital, which must be done by hand.

After the foregoing instructions have been considered, it will be evident to the painter, that no methods can be employed by which the bases and capitals of columns may be delineated with mathematical

\* In the line A B, Fig. 2, No. 2, the points 6, 7, O, correspond with the points 6, 7, O, in the geometrical plan Fig. 2, No. 1; which points are transferred from the line A C, by the point d V 2, so as to produce the ordinates for the construction of the ellipsis F.

certainty;

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certainty; particularly those of the Ionic, Corinthian, and Composite Orders: therefore, they who are engaged in that line of art, in which the representations of such objects are required, will do well to provide themselves with small models of such parts of the principal orders, about four or six inches diameter, and work from them.

Yet the student should consider and copy the examples here given; for by so doing he will acquire the principles which must guide him in the representation of such objects, which are so intricate in their forms, that although they cannot be decidedly drawn by the rules of perspective, yet they can never be elegantly delineated by those who possess not a competent skill in that science.

Left it should be objected, that the foregoing instructions are too concise, it must be observed, that they ought not to be studied without a previous acquaintance with the foregoing parts of this Section, as well as of the science of architecture itself: for although the principles of construction be as simple as any problem in the science; yet the figures are composed of so many repetitions of similar forms, that to offer more explicit examples than are here given, would produce such confusion as to render them unintelligible; and what are given will be better understood by attending to the following observations.

All the members of the Tuscan and Doric capitals, as also their bases, together with the bases of the other orders, are composed of circles: therefore, all that can be done is to obtain the perspective representations of as many squares as may contain ellipses expressive of the different members required; which squares should be disposed parallel or obliquely to the picture, as may be necessary; each of those squares must then be divided by two diagonals, two diameters, and two ordinates,

nates, the latter intersecting the diagonals in the same points in which the diagonals are intersected by the circle; by which process eight points are obtained, through which an ellipsis is drawn by hand, part of which will represent the line of moulding required.

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For the representations of the capitals of the other orders, as of the Ionic, the Corinthian, and Composite, the author forbears to attempt any examples; because their forms are so extremely complex, that no intelligible or satisfactory instructions can be given upon such intricate subjects. This is acknowledged by the senior Malton in his first volume, who yet has given examples of the Ionic and Corinthian capitals in his XXII Plate: but as if resolved to render difficulties totally unintelligible, he has so entangled the lines of construction, that no patience can unravel the web of his diagrams; consequently, no artist can receive much, if any assistance from his instructions upon this subject.

The only process that can afford any assistance to the artist, is to describe a square in perspective, that may contain the abacus, and through the angles of such square to draw the diagonals that shall direct the position of the volutes. Then below the abacus find the representations of two circles, that may serve as guides for the disposition of the leaves or acanthi, if the capital be Corinthian or Composite: and this is the most that can be done by way of correct arrangement; the rest must depend upon the eye and hand of the painter, who should procure models of such capitals, and dispose them in proper situations, especially if the work be large in which the representations of such ornaments are required.

As it would be improper to give finished examples of the objects, entangled with all the lines that are necessary for their construction, two finished representations are given at the commencement of this work, drawn to the same dimensions with those given in Plate XXIV;  
the

SECT. III. the base, as before observed, having the plinth *parallel*, and the capital having the abacus *inclined* to the picture.

Plate XXIV.

*Of Arches which are in Planes inclined to the Picture.*

Plate XXV.

PLATE XXV. The representations of arches which are inclined to the picture are easily obtained, by those who understand the manner of representing the circle, for the process is nearly the same in both cases, but with this additional circumstance, that it is necessary to represent the thickness or soffit of the arch; and therefore the exterior proportions by which the semi-ellipsis, that represents the arch in the front, are obtained, must be transferred to the interior of the piers, thereby to obtain the representation of that semicircle which lies within, and determines the thickness of the arch.

Let Fig. 1, Plate XXV. represent a small building, fitted to contain a garden seat, with an arch in front; which front is inclined to the picture.

H H is the horizontal line.

C is the center of the picture.

G G is the base line.

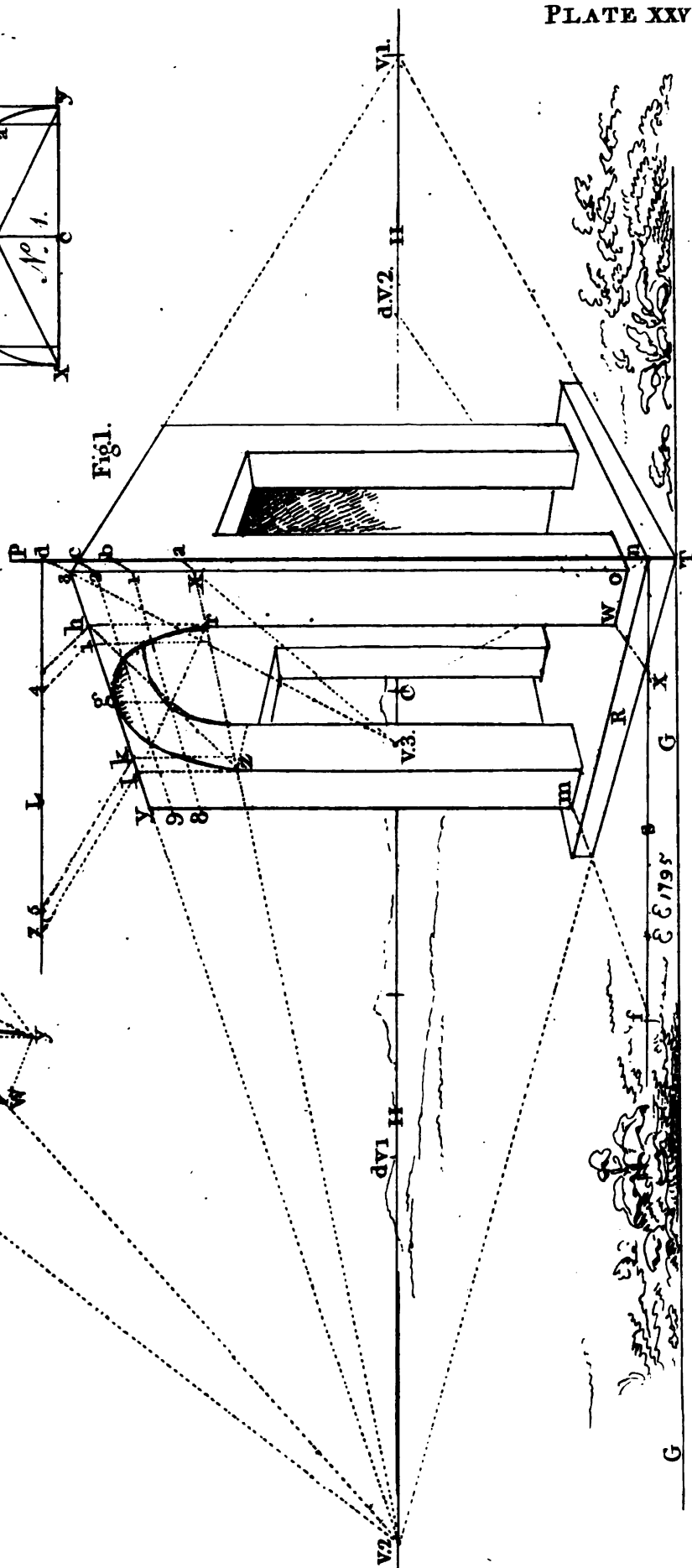
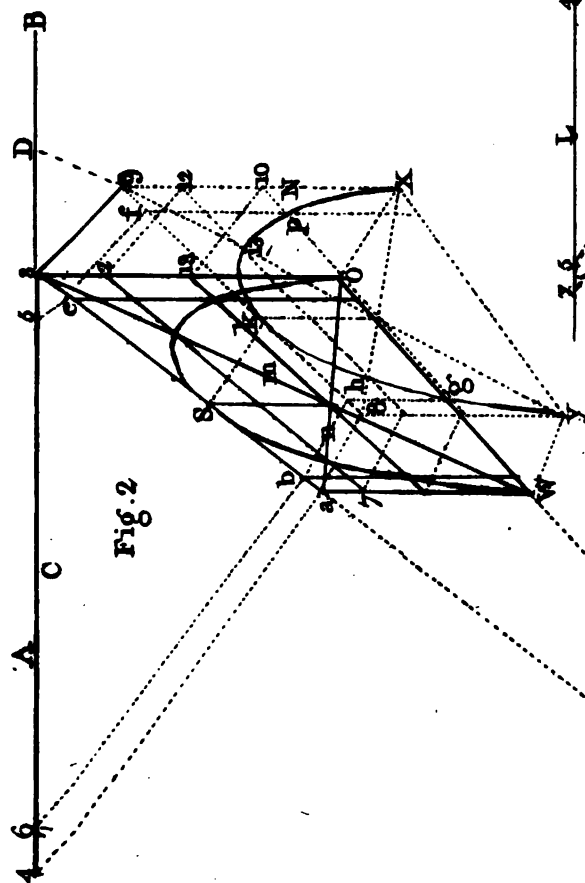
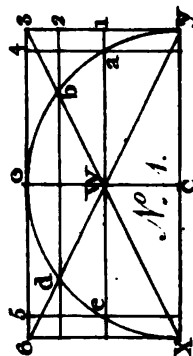
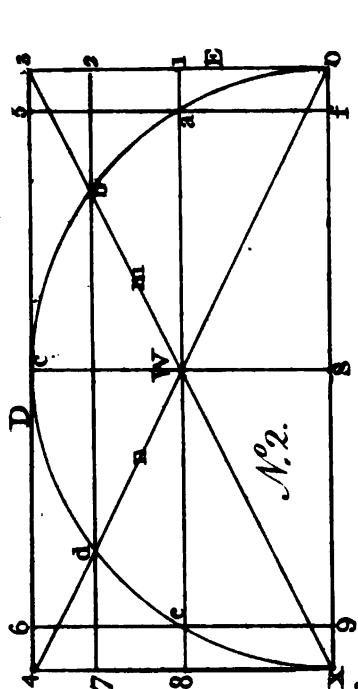
V 1 and V 2, are the vanishing points for the front and sides of the building; and d v 2 is the distance of the vanishing point V 2, as d v 1 is the distance of the vanishing point V 1.

V 3 is the vanishing point of the diagonal or mitre line.

T is the angle of the step or plinth, which touches or intersects the picture.

Although the general form of this example differs but little from many of the foregoing, yet part of the process for obtaining the principal lines shall be repeated.

The







The point T, as before observed, is the intersection of the step with the picture; therefore, at the point T draw the line T P perpendicular to the base line G G; and upon that line set up the height of the building, as from T to d; and from T, upon the same line, the height of the step, as at n. At the point n draw the line n S parallel to the horizontal line.

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Then the line S n, may be considered as the base line, because it is in the plane of the horizontal surface of the step or plinth: therefore, all the measures for the width of the building, together with that of the plinth, may be applied upon that line.

Having completed the representation of the step or plinth R, which must be done by the method already taught in the construction of steps, page 124, proceed to the representation of the body of the building; for which purpose determine the point o, which is the lowest angle of the nearest pier, upon the step.

This point is obtained by drawing a line from the angle n of the step, to the point V 3, which is the diagonal vanishing point; and then cutting off the portion n o, by the same process that was employed to obtain the point S, the nearest angle of the representation of the parallelogram, Fig. 2, Plate XI.

Having obtained the point o, draw a line from the point d V 2 through o, till it intersects the line S f, as at p; and from p set on to f the measure of the width of the front of the building, and from f return a line to the point d V 2, which will intersect the front in m; consequently the space m o is the width required.

To those who have considered the instructions contained in the foregoing part of this Section, it will be unnecessary to continue a repetition of what has been already taught; therefore let it be supposed that the general form of the object is completed, except the arch, for the representation of which proceed as follows:

Z

Upon

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 Upon any part of the paper, or upon a detached piece, draw a  
 femicircle, whose diameter is equal to the chord of the required arch,  
 as at No. 1, and circumscribe that femicircle with the parallelogram  
 s 6 X y.

Then draw the diagonals s X and 6 y, and through the center  
 W, draw the diameters a e and c o.

Through the points in which the diagonal lines cut the femicircle,  
 as b and d, as also through the center W, draw right lines parallel to  
 the longest sides of the parallelogram, as the lines b d and a e.

Then through the points in which the femicircle is intersected by  
 the longest diameter a e, draw the right lines a 4 and e 5, parallel  
 to the shortest sides of the parallelogram; and the lines so drawn  
 will intersect the sides of the parallelogram in the points 1, 2, 4, 5;  
 which points, when transferred to Fig. 1, will be the guides for the  
 delineation of the perspective representation of the arch. To complete  
 which, proceed as follows:

At the point d, Fig. 1, which, as before observed, marks the  
 extreme height of the arch at the intersection of the diagonal of the  
 building with the picture, draw the line d L parallel to the horizontal  
 line; which line must be considered as the intersection of the plane  
 of the top of the building with the picture.

The line o 3, is the angle of the building, the apparent height of  
 which is found by drawing a right line from the point d to the  
 diagonal vanishing point V 3, which gives the intersection 3;  
 from which point a line drawn to the vanishing point V 2, pro-  
 duces the indefinite representation of the top of the front, as the  
 line 3 y.

The lines which represent the apparent breadths of the piers in  
 Fig. 1, when continued upwards, intersect the line 3 y in the points  
 h, l; consequently the space h l is the representation of a line inclined

to.

to the picture, equal the line *s 6* in No. 1, which line is equal the chord of the arch, the representation of which is required.

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XXV.

Therefore, through the points *h, l*, draw lines from the point *d V 2*, which may intersect the line *d L* in the points *6* and *7*.

Then with compasses take the space from *3* to *4*, in the line *s 6* No. 1, and set that measure from *6* to *4*, and from *7* to *5*, in the line *L d*, Fig. 1; and from the points *4* and *5* draw lines to the point *d V 2*, and they will intersect the upper line of the building in the points *i* and *k*; draw also a line from the point *L* to the point *d V 2*; which will give the intersection *g*, the middle of the crown of the arch.

Then determine the height of the arch as follows:

Take with the compasses the radius or femidiameter of the arch; or, which is the same thing, the measure of the shortest sides of the parallelogram No. 1, and set it downwards on the line *d T*, Fig. 1, from the point *d* to *a*; and divide that space into as many small parts as there are divisions in the line *s y*, No. 1; that is, transfer the spaces marked *3, 2, 1*, in No. 1, to the line *d T* in Fig. 1, as from *d* to *c*, equal *3 2*, and from *c* to *b*, equal *2 1*; and from the points *a, b, c*, draw lines to the diagonal vanishing point *V 3*; and they will intersect the angle of the building in the points *X, 1, 2*; and from those points draw lines to the point *V 2*, the vanishing point of the front of the building.

Then from the points *i, k*, draw lines parallel to the vertical angles of the building, or, which is the same in effect, perpendicular to the horizontal line; and those lines will intersect the line *1 8* in the points *t* and *u*; which two points are in the semi-ellipsis that forms the representation of the arch.

At the points *h* and *l* draw the diagonals *h z*, and *l r*; and the intersections of those lines with the line *2 9* will give two additional points for the delineation of the arch; which, together with the

*Z 2*

points

SECT. points g r and z produce seven points ; through which a curve line  
 III. drawn by hand will be the representation of the outer line of the  
 Plate arch.  
 XXV.

It next follows to determine the thickness or soffit of the arch ; which requiring many lines, is given at greater magnitude in Fig. 2. and No. 2, the better to explain the process.

Example, Fig. 2, in the same Plate.

*Of the Method by which the Soffit or thickness of an Arch is determined.*

The center of the picture, together with the vanishing points and their distances, are the same with those employed in the foregoing Example.

The geometrical figure, No. 2, shews the arch at full size, which being inclosed in a parallelogram, the diagonals m and n are drawn, together with the diameters 1 8 and c S, as was done in No. 1 of the foregoing Examples.

The diagonals intersect the semicircle in the points b and d, and the diameters in the points a, e, and c.

Through the points b, d, right lines are drawn parallel to the longest sides of the parallelogram, as the lines 1 8 and 2 7 ; and through the points a and e lines are drawn parallel to the shortest sides of the parallelogram, as the lines 5 f and 6 9.

It must be observed, that those lines are drawn for the purpose of marking the projections or seats of the points a, b, c, d, e, in the semicircle, upon the different sides of the parallelogram which contains that semicircle.

Fig. 2 is the perspective representation of No. 2.

The line o 3 being similar to the line h r in Fig. 1, must be considered.

considered as the inner line in the front of the nearest pier continued upwards, equal the height of the semidiameter of the arch, of which the representation is required.

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At the point 3 draw the line A, parallel to the horizontal line, and from the point 3 set off to 4 the measure of the chord or breadth of the arch, equal the line 3 4, in No. 2.

From the points 0 and 3 draw lines to the vanishing point V 2, and from the point 4 in the line A draw a line to d V 2, which is the distance of the vanishing point V 2; and the intersection of the latter line with the line that is drawn from 3 to V 2, as at the point a, will determine the breadth of the arch.

At the point a draw the line a W parallel to the line 3 0, and the trapezium, which must contain the representation of the arch, will be completed; the angles of which are 3 0 a W.

It is unnecessary to continue the instructions for the representation of the front of the arch, the process being the same with that before employed in Fig. 1, and which will be easily understood by comparing the latter Example with the former; the only difference to be observed is, that the arch in the first Example is distant beyond the picture; whereas that in the second Example has the angle 0 3 touching the picture; which circumstance occasions a slight variety in the operation, which hereafter will be noticed. In the mean time it will be proper to proceed to the construction of the thickness or soffit of the arch, which is determined by the following process:

From the point 3 draw a right line to the vanishing point V 1, as the line 3 9.

Then continue the line A, which is drawn parallel to the horizontal line, from the point 3 towards B, as far as may be thought necessary.

Then from the point 3, which marks the height of the arch, set off

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 Plate XXV.  
 off by the compasses the measure of the soffit or depth of the arch, as from the point 3 to D; and from D draw a line to the point d V 1, the distance of the vanishing point V 1, which will intersect the line that is drawn from 3 to V 1 in the point 9: then is the line 3 9 equal the apparent thickness of the soffit.

At the point 0 draw a line to the vanishing point V 1, and at the point 9 draw the line 9 X parallel to the line 3 0.

Then from the points 9 X draw lines to the vanishing point V 2, and from the points a and W draw lines to the vanishing point V 1, which will produce the representation of a second trapezium, which must enclose the semi-ellipsis, representing the inner outline, which determines the breadth or soffit of the arch.

The angles of the inner trapezium are at the points 8, 9, y, X; therefore, through those points draw the diagonals 8 X and 9 y.

Then transfer the points which are in the top and nearest side of the first or front trapezium, to the top and nearest side of the second or inner one.—Thus, from the points 1 and 2 draw lines to the vanishing point V 1, which will intersect the nearest side of the inner trapezium, in the points 10 and 12; and from the points c S b in the top of the nearest, draw lines to V 1, which will intersect the top of the inner trapezium in the points f and k.—The third intersection, which is near the point 8, is not marked, to prevent confusion.

From the points 10 and 12 draw lines to the vanishing point V 2, and at the points f and 8 draw lines parallel to the line 9 X, which is the side of the remote trapezium; and the mutual intersections of those lines will produce the points by which the semi-ellipsis must be drawn; that will express the depth or inner edge of the soffit of the arch.

As it is not possible to mark or figure every point necessary to indicate the curvature of both the semi-elliptical lines by which the arch is represented, without producing confusion; the points necessary for

for the *inner one* only are marked; as at P, 13, k, h, g, X, and y, in Fig. 2; and in the Example Fig. 1, the *outer* semi-ellipsis only is marked by the points necessary for its construction, as the points F, P, u, g.

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XXV.

As it is impossible to avoid the appearance of intricacy and labour in the construction of the Examples, the student will do well to consider them attentively, so that he may perfectly comprehend the principles of their construction, and thereby be enabled to employ the leading lines when required, without regard to the minuter divisions, which may be omitted.

By the preceding instructions, together with the Examples in Plate XXIII. are shewn the methods for obtaining the representations of circles and semicircles, whether the planes in which they are seated are inclined or perpendicular to the picture; and the whole of the process consists in determining the perspective representations of certain given points in the original circle or semicircle, and then drawing the required representation through those acquired points.

The same method must also be employed to obtain the representations of all other kinds of arches, as the Gothic, the Elliptic, and the Catinarian; as also for the representations of all objects composed of curved lines, such as semicircular and compound pediments, with every other variety that can be required in curvilinear figures: and although these rules cannot ensure just or pleasing representations, without assistance from the hand of a skilful artist; yet if these general hints are not understood and applied in a certain degree, no one must hope to produce the representations of curved lines in architecture, but what will be distorted and unpleasant to the eye.

Of

## SECT.

## III.

*Of Mouldings inclined to the Picture.*

Plate  
XXVI.

In Plate XXVI, is an example of a pedestal \* with its cornice, which is inclined to the picture.

C is the center of the picture.

H is the horizontal line.

G is the ground line or base line.

The eye or distance is marked *Eye*.

P P is the parallel of the picture.

V 1 and V 2 are the vanishing points, found as before directed;

And d v 1, d v 2, are the distances of those vanishing points.

V 3 is the vanishing point of the diagonal of the dado of the pedestal; consequently, it is the vanishing point for the mitres of the mouldings, and d v 3 is the distance of that vanishing point.

The vertical lines f, at the bottom and f 2, at the top of the pedestal, are both parts of the same line, which is the intersection of the picture by the angles of the lowest step and cornice; or in other words, it is the line in which those parts touch the picture.

First determine the representation of the steps and dado of the pedestal, as follows: X is the seat upon the ground of the angle of the lowest step; therefore, set up from that point the height of the first step to e, and complete the general form of the whole step, by drawing lines to the vanishing points V 1 and V 2.

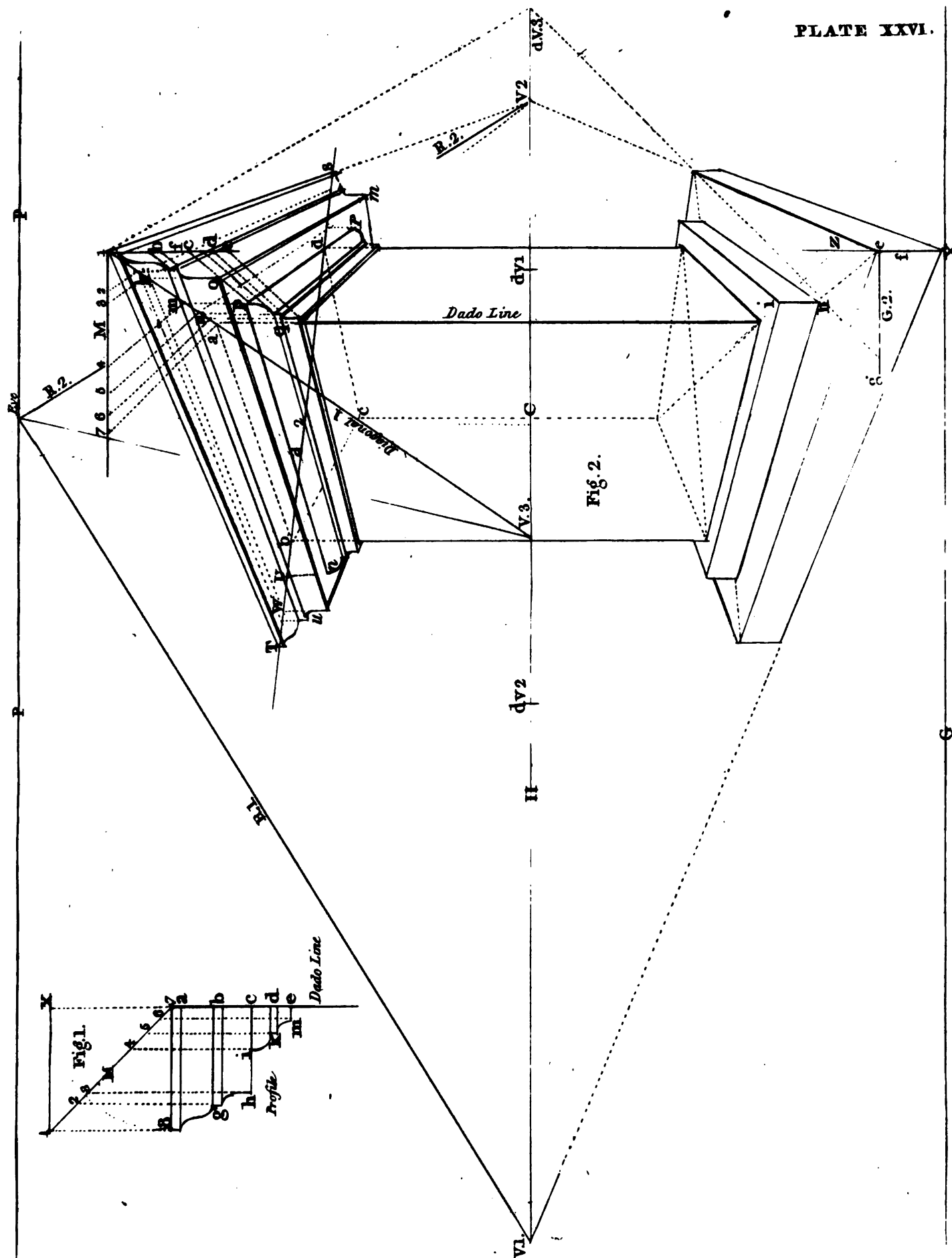
At the point e draw the line e g parallel to the ground line.

Then from e to g set on the depth of the mitre or diagonal of the

\* To this, as also to some of the following Examples, there is no annexed scale; because the mouldings are drawn at their given size upon the Plate: therefore, the steps and dado are drawn in proportion to those mouldings.

The distance of the picture is rather too short in this Example, which is so disposed, the better to demonstrate the process.







step\*, and from g draw a right line to d V 3 (the distance of the diagonal vanishing point) and the intersection at h will give the feat of the angle of the second step.

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XXVI.

Complete the second step by the methods given in Example, Plate XVI. page 126, as also the dado of the pedestal; which dado is terminated at the top in the points a, b, c, d.

Through those points draw the diagonals marked *Diagonal 1* and *d 2*.

Observe, that a, is the apparent height of the dado of the pedestal, including the steps and cornice; which height is obtained by setting up the real measure from X in the base line to 1 upon the line f, and from 1 drawing a line to V 3, the vanishing point of the diagonal, which line intersects the angle of the dado at a, and gives the required height.

After having thus prepared the pedestal, proceed to the cornice, as follows :

Upon any remote part of the drawing, or upon any separate paper, draw the geometrical profile of the mouldings, at their true dimensions, by a scale, as at Fig. 1; above which draw the square X 1 8 7, each side equal to the projection of the upper line 7 8 of the cornice : At the point 7 draw the line 7 M 1, which will be the diagonal or mitre line of the cornice.

Parallel to the line, e 7, which is marked dado line (and corresponds with the line fo marked in Fig. 2.) draw lines from every projection of the members, as from g, h, i, k, m, that may intersect the mitre line M in the points 2, 3, 4, 5, 6; which points will express the projections of the various members at their joints or mitres.

Having thus prepared the geometrical profile, Fig. 1, which is the guide for the perspective representation, proceed as follows :

At the point 1, Fig. 2, which projects equally with the lower step,

\* That is, the space between the upper angle of the first step and the lower angle of the second step; the former marked e, the latter h.

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XXVI.

draw the line 1 M parallel to the horizontal line, upon which set on from the point 1 the following spaces, 1, 2, 3, 4, 5, 6, 7, equal to the similar points in the mitre line M of the geometrical profile Fig. 1; then from those points draw lines to the distance of the vanishing point d V 3; which lines will intersect the space upon the diagonal line that lies between the points 1 and a; which intersections mark the *projections* of the different mouldings, as at the points k, m, n, a.

Then upon the line f 1, Fig. 2, set downwards from 1 the *heights* of all those members, as at the points b, c, d, e, equal the same points in the dado line of the geometrical profile, Fig. 1.

From the points b, c, d, e, draw lines to the diagonal vanishing point V 3.

Then from the points k, m, n, a, in the line which is drawn from the point 1 at the angle of the cornice to the point V 3, draw lines perpendicular to the horizon, which lines will intersect those that are drawn from the points b, c, d, e, to the diagonal vanishing point V 3 in the points o, p, q, which points determine the angles of the profiles of the mouldings, the curved parts of which must be drawn by hand, and the right lined parts by the ruler.

From the points o, p, q, draw lines to the vanishing points V 1 and V 2, which will determine the appearances of their different faces.

Then find their terminations or projections at the angles S and T, as follows:

Transfer the points k, m, n, a, to the diagonal line S T, by lines drawn from all the points marked k, m, n, a, to the vanishing points V 1, V 2, till they intersect the diagonal line S T in the points b, u, w; from which points draw lines perpendicular to the horizon, that may intersect the lines that tend to the vanishing points, as at m, P, and n, u; which points are the projections of the different members at those mitre angles, and which must be completed by the same process employed at the angle O 1.

In.

In examining this figure it will easily be seen, that the projection of the mouldings are first marked upon the mitre line, by transferring their measures, which are marked upon the line M, by means of the point d V s, which is the distance of the vanishing point of the mitre line.

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XXVI.

It must be observed, that in this diagram, as in the others, the occult or dotted lines are no more than accessory lines, which, though absolutely necessary for the production of the figure, are useless after it is finished. Of these some are wanting. They are omitted to avoid confusion: but the student will easily comprehend the whole, if he carefully examines those which are given, and above all comparing them with some real mouldings, which he would do well to procure for the purpose; for, without being well acquainted with their real construction, it is impossible to delineate them with accuracy.

It is needless to observe, that if mouldings were required at the base of the pedestal, they must be produced by the foregoing process reversed; which will easily be understood by turning up the example, and supposing a b to be the lowest line of the base of the dado.

In closing this Section it will be proper to observe, that it contains a selection of Examples, which the author considers as being the most useful to the artist, at the same time that they illustrate the most elegant and simple principles of the science, as far as relates to objects which have their sides disposed obliquely or inclined to the picture.

But the figures, which are particularly recommended to the consideration of the student, are the following:

The square and parallelogram, Plate XI. the representations of the houses, Plate XII. and XIII. the table, Plate XIV. together with the chair, and pentagon, Plates XIX. and XXII. all of which are of the utmost consequence to the artist who wishes to attain perfection in his designs and pictures: therefore, those Examples are recommended to his particular attention and consideration.

SECT.  
III.  
Plate  
XI.

To the foregoing observations it is necessary to add the following caution :

Let it ever be remembered that the representations of those horizontal lines, which produce the appearances of the sides or faces of right lined figures, are constantly drawn to the vanishing points; but the measures, or proportionate divisions of those lines are determined by drawing lines from the points which mark the real measures on the base line, to the *distances* of those *vanishing points*, to which the representative lines are drawn. Thus, in the parallelogram Plate XI: Fig. 2, Page 100, the line S 8, which expresses the indefinite representation of the side D, is drawn to the vanishing point V 2; but the length or required portion of that line is determined by drawing a line from the point 6 in the base line, to the point d V 2 in the horizontal line, which gives the intersection 8; after which the side A is formed by drawing a line from the point 8 to the point V 1, which is the vanishing point of lines, the originals of which are at right angles with those represented by lines drawn to the vanishing point V 2.

The above caution is the more earnestly recommended to the student, because the author has found by long experience, that the young practitioner is more apt to forget, or mistake this part of the process, than any other in the operation.

It cannot be improper to observe, by way of conclusion, that as the old writers on the science of Perspective knew nothing of oblique vanishing points, so were they consequently ignorant of their distances: from which circumstance it followed, that they never could proportion the representations of objects inclined to the picture by just measures: which defect may be seen in the Jesuit's Perspective, in which the representation of a house inclined to the picture, given in the upper Example of page 111 is false, owing to the want of those points.

END OF THE THIRD SECTION.

## SECTION THE FOURTH.

*Containing Examples, the Lines and Planes of which are inclined both to the Picture and Horizon.*

IN this Section instructions are given for the representations of objects, the component lines or planes of which are inclined both to the picture, and to the horizon.

Before the student proceeds to investigate the subject of this Section, it will not be improper for him to re-consider the principles laid down in the second and third preceding Sections.

The second treats of objects, the lines and planes of which are *parallel*, and *perpendicular* to the picture.

The third, of objects the lines and planes which are *inclined* to the picture.

And then the following, or fourth Section, that treats of objects composed of lines and planes which are inclined to the *picture*, and also to the *horizon*.

By considering the principles contained in this and the foregoing Sections, the student will easily perceive, that lines and planes may be disposed in all the following directions :

First, Parallel,	}	to the picture ;
Secondly, Perpendicular,		
Thirdly, Inclined,		
Fourthly, Inclined, both to the picture, and also to the horizon.		

These

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IV.

These are all the varieties in which lines or planes can be disposed to the picture, or in other words, to the eye of the spectator.

To familiarize these distinctions, let it be supposed, that a house whose plan is \* oblong or square, be so disposed to the eye of the spectator, that the lowest line of the base and the upper line of the blocking course of one of its sides, appear perfectly parallel to each other: then is that front parallel to the picture; consequently, the sides are perpendicular to it, combining the first and second position of lines and planes.

Or, let it be supposed that the same building be seen by the spectator from such a station, that the lower lines of the base, and the upper lines of the blocking course, on both the sides, appear to approach each other: then are the sides of that building inclined to the picture, which is the third position of lines and planes.

Again, suppose the same building, as seen in the foregoing situation, be covered with a sloping or inclined roof; then will the lines and planes of such roof be inclined, not only to the picture, but also to the horizon.

Example, Plate III. Fig. 1 and 2.

PLATE  
III.

In Fig. 1, the fronts B and E of the buildings are parallel to the picture, and the sides A and G are perpendicular to it, uniting the first and second positions of lines and planes.

In Fig. 2, the sides X 1, X 2, are inclined to the picture, and the roof R 2 is inclined to the horizon; consequently, the line R 2 of the roof † has a double inclination, being inclined both to the picture, and also to the horizon.

\* An oblong hath all its angles, right angles, but has not all its sides equal.  
Simpson, Defin. 31st.



In Fig. 1, the building A B has a roof, the planes of which are all inclined to the horizon: but it must be observed, that two of those planes, although inclined to the horizon, are yet perpendicular to the picture, as the plane R, and its opposite; while the front plane T, and its opposite are inclined to the picture as well as to the horizon.

SECT.  
IV.  
Plate  
III

As the instructions contained in this Section cannot be intelligible to those who do not understand the nature and construction of vanishing lines, it will be necessary to bestow particular attention on this abstruse part of the science, and to consider the subject in a more theoretic view, than has been hitherto employed in this Treatise.

By the general construction of objects of art, the lines and planes of which they are composed are seldom inclined to the horizon, though they are frequently so situated to the picture; therefore it is seldom necessary to employ any other vanishing line than the horizontal line.

But when the line or plane to be represented is inclined to the horizon as well as to the picture, then other vanishing points, not in the horizontal line, must be found; and it must be remembered, that in most cases the vanishing line of an inclined plane cannot be determined, unless the vanishing points of two right lines in that plane are first found.

#### Example.

In Plate III. Fig. 2, the house T has its sides or planes inclined to the picture, while the roof is inclined to the horizon.

The tops and bottoms of the windows and doors are horizontal; therefore they vanish in the points V 1 and V 2, which points are in the horizontal line, or in what is called the vanishing line of horizontal planes.

But

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IV.  
Plate  
III.

But the lines of the roof in the side X 2, which are inclined to the horizon, vanish in the point R; which point is in the vanishing line of the plane or side X 2 of the building.

When an original vertical plane is inclined to the picture only, there is no great difficulty in finding its vanishing line; but when an original plane is inclined both to the picture and to the horizon, the process for determining its vanishing lines is more intricate and abstruse.

In the first case, nothing more is necessary than to find the *vanishing point* of any horizontal line in the inclined plane, and through that point draw a right line perpendicular to the *horizontal line*; which will be the vanishing line sought\*.

Example, Plate III. Fig. 2.

V 2 is the vanishing point of all horizontal lines in the *vertical* plane or side of the house X 2, found by the methods taught in the preceding Section; therefore, through V 2 draw the line V 2 R, *perpendicular* to the horizontal line H, and it will be the vanishing line sought, and it is so marked: vanishing line of side X 2.

PLATE  
XXVII.

Again, in Plate XXVII. Fig. 1, C is the center of the picture, and the vanishing point of all the horizontal lines in the planes or fronts of the houses A, B; therefore, through the point C draw the right line V 1, V 2, perpendicular to the horizontal line; which will be the vanishing line of the fronts A and B.

In Fig. 2, of the same Plate, V 2 is the vanishing point of all horizontal lines in the fronts of the houses A and B; which fronts are inclined to the picture; and the line V 3, V 4, which is drawn

\* Every vanishing line is parallel to its original plane; therefore the horizontal line in the picture is parallel to the plane of the earth. And as every vertical plane is perpendicular to the horizon, so the vanishing lines of vertical original planes are, in the picture, perpendicular to the horizontal line.





through the point V 2 perpendicular to the horizontal line H, is the vanishing line of the fronts A and B.

SECT.  
IV.  
Plate  
XXVII.

*Rudiments of Planes inclined to the Horizon.*

In Plate XXVII. which is the first Plate of the fourth Section, are two Examples, in which lines are inclined to the horizon, as in the roofs of the buildings A, B, Fig. 1 and 2, and in the sloping edges of the walls F G, Fig. 1.

It must be observed, that in Fig. 1, the lines a 2 and b 2 are in the plane of the fronts of the houses A and B; which plane is vertical and *perpendicular* to the picture.

In Fig. 2, the lines g b, k f, are, like the former, in the plane of the fronts A, B; but the vertical plane in which they are seated is *inclined* to the picture; consequently, the line V 3, V 4, is the vanishing line of that plane.

The fronts A and B, in Fig. 1, being perpendicular to the picture, the *vanishing line* of those fronts is the prime vertical line, which is drawn through C, the center of the picture, perpendicular to the horizon, as the line V 1, V 2\*.

The prime vertical line being drawn, and the lower parts of the houses completed by the rules which are given in the first Section, proceed as follows:

At the distance of the picture (which is so marked) upon the horizontal line construct an angle †, equal to the known pitch of the roof, as the angle H P K, Fig. 1, equal to c b d, Fig. 1, No. 2; and continue the line K till it cuts the prime vertical line at V 1:

\* As the center of the picture is the *vanishing point* for all *lines* perpendicular to the picture, so the prime vertical line, by passing through the center of the picture, is the *vanishing line* of all *planes* perpendicular to the picture.

† For the construction of the angle, see the instructions page 9.

B b

then

SECT. then will V 1 be the vanishing point for the lines a and  $\alpha$  of the  
 IV. roofs.

Plate  
 XXVII.

To find the other vanishing point V 2, below the horizontal line, construct the angle H P N, equal to the angle c d b in No. 2, and continue the line N till it cuts the prime vertical line at V 2, which will be the vanishing point for the lines in the roofs marked 2 and e.

The sloping edges or tops of the walls, or blocks G F, having edges, I K, with the *same inclination* to the horizon with the pitch of the roofs, and their sides G and F being perpendicular to the picture, have the same vanishing point V 1, with the lines a and  $\alpha$  of the roofs.

The vanishing *points* of all lines are in the vanishing *line* of the plane in which those lines are seated. Thus the lines of the roofs, windows, and doors in the fronts of the houses A and B, Fig. 2, have their vanishing points in the line V 3, V 4; that being the line in which the plane A B vanishes.

To complete the forms of the roofs, draw lines from the angles of the buildings to the vanishing points V 1, V 2, alternately; and those lines will produce the perspective representations of the roofs.

The vanishing points V 1, V 2, may be found by another process, as follows:

In any part of the paper or canvas, as may be most convenient, draw the form of the roof or pediment geometrically, as Fig. 1, No. 2, with its base G, parallel to the horizon.

Then through the point P, which is the distance of the picture, draw the lines K and X parallel to the lines a,  $\alpha$ , in Fig. 1, No. 2; and the lines K, and X, will produce, by their intersections with the prime vertical line, the vanishing points required, as at V 1 and V 2 in Fig. 1.

In

In Fig. 2, the fronts and sides of the buildings A and B are inclined to the picture; therefore their forms, except the roof, are produced by the rules given in the foregoing Section.

SECT.  
IV.  
Plate  
XXVII.

C is the center of the picture, D is the eye or distance, V 2 is the vanishing point for all the horizontal lines in the fronts A and B of the houses, the lower parts of which are drawn by the rules given in the third or foregoing Section.

Through the vanishing point V 2 draw the line V 3, V 4, perpendicular to the horizontal line, and at d V 2, which is the distance of the vanishing point V 2, construct the angle b a c, equal to the angle of the pitch of the roof in Fig. 2, No. 2; draw the line from d V 2 through c, till it cuts or intersects the vanishing line V 2 in the point V 3: then will V 3 be the vanishing point for the lines f and g of the roofs.

To obtain the vanishing point V 4, at the point d V 2 construct the angle b a d, *below the horizontal line*, similar to the angle b a c; and draw the right line a d, continuing it till it intersects the line V 3, V 2, in the point V 4: then will V 4 be the vanishing point for the lines representing the farther edges of the declining sides b b of the roofs.

Having found the vanishing points V 3, V 4, finish the roofs by drawing lines from the angles k, l, m, n, of the buildings to the vanishing points V 3 and V 4; and the fronts of those objects will be determined in their general appearance.

*Roof inclined to the Horizon.*

In Plate III. Fig. 2, is an Example of a building, the sides of which incline to the picture, with a \* roof inclined also to the horizon.

PLATE  
III.

It is not necessary to give instructions for the delineation of the body of the building, such having been repeatedly given in many

\* The species of roof given in this Example is common in Italy.

SECT.  
IV.  
Plate  
III.

parts of the foregoing Section; therefore the following instructions will be confined to the roof, that being the only part of the Example which belongs to this Section.

The points V 1 and V 2 are the vanishing points of the sides X 1 and X 2 of the building; which sides are vertical or perpendicular to the horizon: therefore, through the point V 2 draw the line V 2 R, perpendicular to the horizon; which line will be the vanishing line of the side of the house X 2, as it is marked in the Example.

At the point b 2 in the horizontal line (which is the distance of the vanishing point V 2) construct an angle equal to the known inclination of the roof to the horizon, and draw a line from b 2 till it intersects the vanishing line of the side X 2, as at R; then will R be the vanishing point for the inclined lines of the roof R 2.

The lines of the roof on the side X 1 are all horizontal; consequently, they vanish in the point V 1.

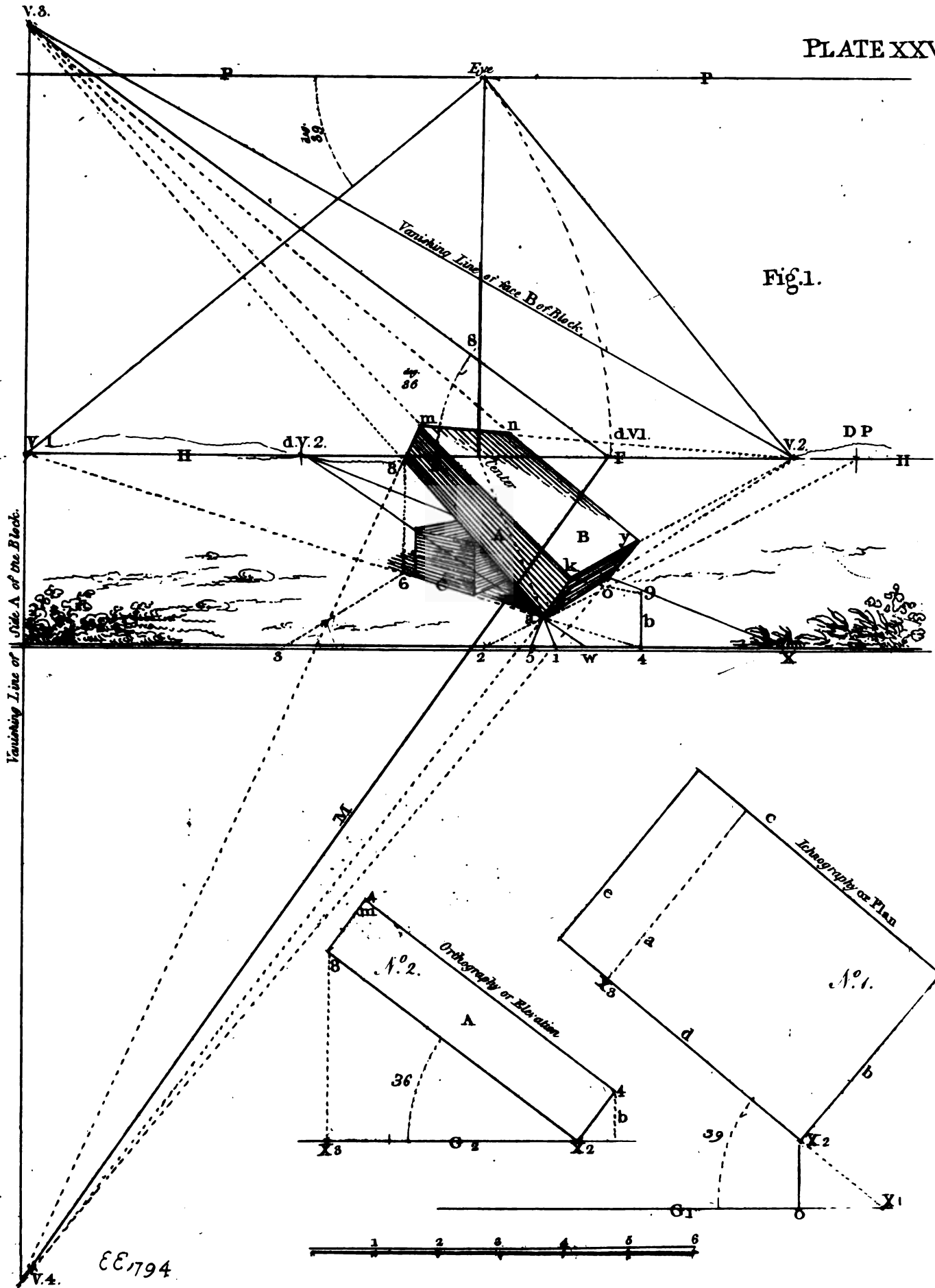
Having determined the vanishing point for the inclination of the roof, draw lines from the point V, and determine its form by the rules which are given in the foregoing Section, and in the next Example of this Section.

It may perhaps be objected, by those who are not skilled in the science, that the lines R 2 of the roof, do not rise, but, on the contrary, sink towards the horizontal line, and therefore do not produce the desired effect. To this it must be replied, that when original lines are very much elevated above the eye, their representations will ever appear to approach the horizon, whether they are inclined or parallel to it;—and those who erroneously suppose the contrary, have only to correct their opinions by examining such objects the forms of which are similar to that which is represented in the given Example. —Some additional observations will be made upon this circumstance in the consideration of views of acclivity and declivity.

*Of*



Fig.1.





*Of Ascending Stairs.*

In Plate XXVII. Fig. 1, is an Example representing two walls F G, parallel to each other, and perpendicular to the picture, the upper lines of which K I are inclined to the horizon.

This figure also demonstrates the best and readiest method of obtaining the representation of ascending stairs, the fronts of which are parallel to the picture, the process as follows :

Having drawn the lines 2 *a*, and 3 *b*, with the proper inclination to the horizon\*, and at the distance from each other equal the breadth of the stairs, draw the line 2 E perpendicular to the base line, upon which set up the heights of the steps, as many as may be required, which in the Example are marked by the numerals 5, 6, 7, 8, &c.

Then from the points so marked draw lines to the center of the picture C, which lines will produce the intersections f, g, h, &c. in the inclined line 2 *a*, which points indicate the nosings or angles of every step.

Therefore, at those points describe the upper angle of every step by drawing lines parallel to the horizon, from the inclined line 2 *a* to its opposite 3 *b*, which lines will represent the upper and outer angle of every step.

The student must observe, that the inclined lines 2 *a* and 3 *b* are to be considered as in an inclined plane, which passes through the nosings or angles of the steps; consequently, those nosings or outer angles are determined in their projections by the lines 2 *a* and 3 *b*.

It is also to be observed, that for the general use of the painter the inclined lines 2 *a* and 3 *b* may be drawn to represent any inclination to the horizon, from 30 to 35 degrees; but the Architect

\* See the instructions, page 186.

who

SECT. IV. who desires to represent ascending steps with accuracy, must first draw the geometrical profile of those steps according to their measures, by which the inclination of the flight must be determined. The above process is more convenient and ready than that which is given in Page 64, Plate XVI.

*Block with double Inclination.*

PLATE  
XXVIII.

In Plate XXVIII. is an Example of a block, which is inclined both to the picture and also to the horizon.

It is inclined to the picture in an angle of  $39^{\circ}$ , and to the horizon in an angle of 36 degrees.

No. 1, shews the geometrical plan of the block, as situated to the picture;

G 1 being the intersection of the picture with \* the original plane. The line from 0 to X 2 indicates its distance beyond the picture.

X 2 is the *seat* of the nearest angle of the block on the *original plane*, and 0 the seat of the same angle upon the *picture*.

No. 2, is the geometrical elevation of the block, shewing its situation to the *horizon*; the line G 2 indicates the original plane, or ground, upon which the block is placed; X 2 is the angle upon which it rests, expressive of the same angle X 2 in No. 1, and of a in the perspective representation.

In the plan No. 1, the lines b and e express the full length of the block: but the line X 3 a marks the seat of the line e on the ground, or original plane, when the end e of the block is elevated.

In the Example Fig. 1, H H is the horizontal line.

P P is the parallel of the picture.

The center of the picture is marked by the word.

\* By original plane is meant, the ground or plane upon which the block rests.

The

The point D P is the distance of the picture, brought down on the horizontal line, and V 1, V 2 are the vanishing points for the sides of the block, agreeably to their inclination to the *picture*; and d V 1, d V 2 are the distances of those vanishing points.

SECT.  
IV.  
Plate  
XXVIII.

The vanishing points V 1, V 2, as also the figure of the block C, on which the inclined one rests, are found by the process which has been taught in the foregoing Section. The seat of the angle  $\alpha$  is also found by the methods which have been shewn by Fig. 2, Plate XI. See instructions, page 100.

V 1 is the *point* in which all the horizontal *lines* vanish, which are inclined to the *picture* in an angle of 39 degrees; consequently, the *vanishing line* of a vertical plane, which is inclined to the picture in a similar angle, will pass through that point\*.

Therefore, through V 1 draw the line V 3, V 4, perpendicular to the horizontal line H H.

Then find the vanishing point V 3, as follows:

At the point d V 1, which is the distance of the vanishing point V 1, construct an angle with the *horizontal line*, equal to the inclination of the block to the horizon, 36 degrees, as the angle S F P.

Continue the line F S till it intersects the vanishing line V 1, in the point V 3: then will V 3 be the vanishing point for all the lines which are inclined to the horizon, both in the upper face B of the block, and also in its parallel face beneath.

\* It must follow, that the vanishing line, of all vertical planes; which are equally inclined to the picture, will pass through the same point, perpendicular to the horizontal line, seeing that every vertical plane is perpendicular to the horizon. The face A of the inclined block, and of C, the under block, are both in one plane, whose vanishing line is V 3, V 4.

Now the angles or edges of the inclined block A B, must be considered as *lines inclined to the horizon*, in a vertical plane, which is *inclined to the picture*: therefore, the vanishing points must be somewhere in the vanishing line of the plane in which those lines are seated.

The

SECT. IV. The block being squared (so called by workmen) the sides A and 0, are consequently perpendicular to the face B; therefore find the vanishing point of lines perpendicular to the face B, as follows:

Plate  
XXVIII.

At the point d V 1, draw the right line M, perpendicular to the line S F, and it will intersect the vanishing line V 1, V 3, in the point V 4: consequently, V 4 will be the vanishing point for the angles of the sides 0 and A of the block.

Having thus found the vanishing points, complete the figure, as follows:

From the point a draw lines to the vanishing points V 1, V 2, V 3, and V 4, as in the Example.

Then from the point d V 1 draw a right line through the point a, till it intersects the ground line at 5.

Then from the point 5 set off to 3 the measure of the seat of the line a 8, equal to the space X 2, X 3, in the orthography No. 2, and from 3 draw a line to the point d V 1; and its intersection 6 with the line which is drawn from a to the vanishing point V 1, will be the perspective seat, upon the ground, of the elevated angle 8 of the block.

From 6 draw a right line perpendicular to the horizon, and it will produce the intersection 8, which will give the apparent length of the side A of the block.

Through the points a and 8 draw right lines to the vanishing points V 4, which will produce the angles m 8 and k a.

Then determine the apparent thickness of the block, as follows:—Continue the line which is drawn from V 1, through a, till it intersects the ground line at 4, and at that point draw the line 4 9 perpendicular to the ground line.

The line b 4, in No. 2, gives the height of the angle 4 of the block above the ground; therefore, take the length of the line b 4, and transfer it to 4 9 in Fig. 1, and from the point 9 draw a right line to

the vanishing point V 1, and it will intersect the line which is drawn from V 4 through a, and produce the point k, the nearest angle in the face B of the block A B.—From k draw a line to the vanishing point V 3.

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IV.  
Plate  
XXVIII.

Then determine the breadth of the block, as follows:

V 2 is the vanishing point for the end k y, and d V 2 is the distance of that vanishing point; therefore, draw a right line from d V 2, through the angle a, till it intersects the ground line at w. Then take the measure of the width of the block, 3 feet 6 inches, by the scale, or equal to the length of the lines a or b, in the plan No. 1, and set it on the ground line from w to X; and from X draw a right line to d V 2, which will intersect the line that is drawn from the point a to the vanishing point V 2, in the point o, making the line a o equal the apparent width of the block.

Through o draw a right line from the vanishing point V 4, producing the intersection y.

Having thus obtained the points a, k, and y, from those points draw lines to the vanishing point V 3, and from k and m draw also lines to the vanishing point V 2; and the representation of the inclined block will be completed.

That the student may with more certainty understand the construction of these figures, it will not be improper to add some observations to the foregoing instructions.

The point X 2 in No. 1, is the same with X 2 in No. 2; while the point X 3 in No. 1 may be considered as the point 8 in No. 2; at the same time observing, that from X 2 to X 3 in No. 1 is the same length as from X 2 to X 3 in No. 2.

The real length of the block is from the line b to e in No. 1; but as it rests upon the line b, having the opposite side elevated equal the height of the line which is drawn from the point X 3 to 8 in No. 2, it follows, that the whole length of the block, from the line b to e,

C c

covers

SECT. covers no more of the ground than is expressed by the line drawn  
IV. from X 2 to X 3 in both figures.

Plate  
XXVIII.

Therefore X 3 in No. 2 is called the seat of the point 8, and the line from X 3 to 8 is called the support of the point 8; while the line drawn from X 2 to X 3 in No. 2 is called the seat upon the original plane of the line X 2, 8, in the original object.

As in Figure 1, there are some points marked which are not alluded to in the foregoing instructions, it will be proper to explain them in this place.

The point a, Fig. 1, which is the angle of the block B upon the ground, is the same point which is expressed by the points X 2, both in the plan and elevation No. 1 and No. 2. It is obtained by the process which hath already been given, but which shall be here repeated.

Fig. 1. The seat upon the picture, of the point a, is at the point 1, and its distance beyond the picture is equal to the length of the line from 0 to X 2 in No. 1.

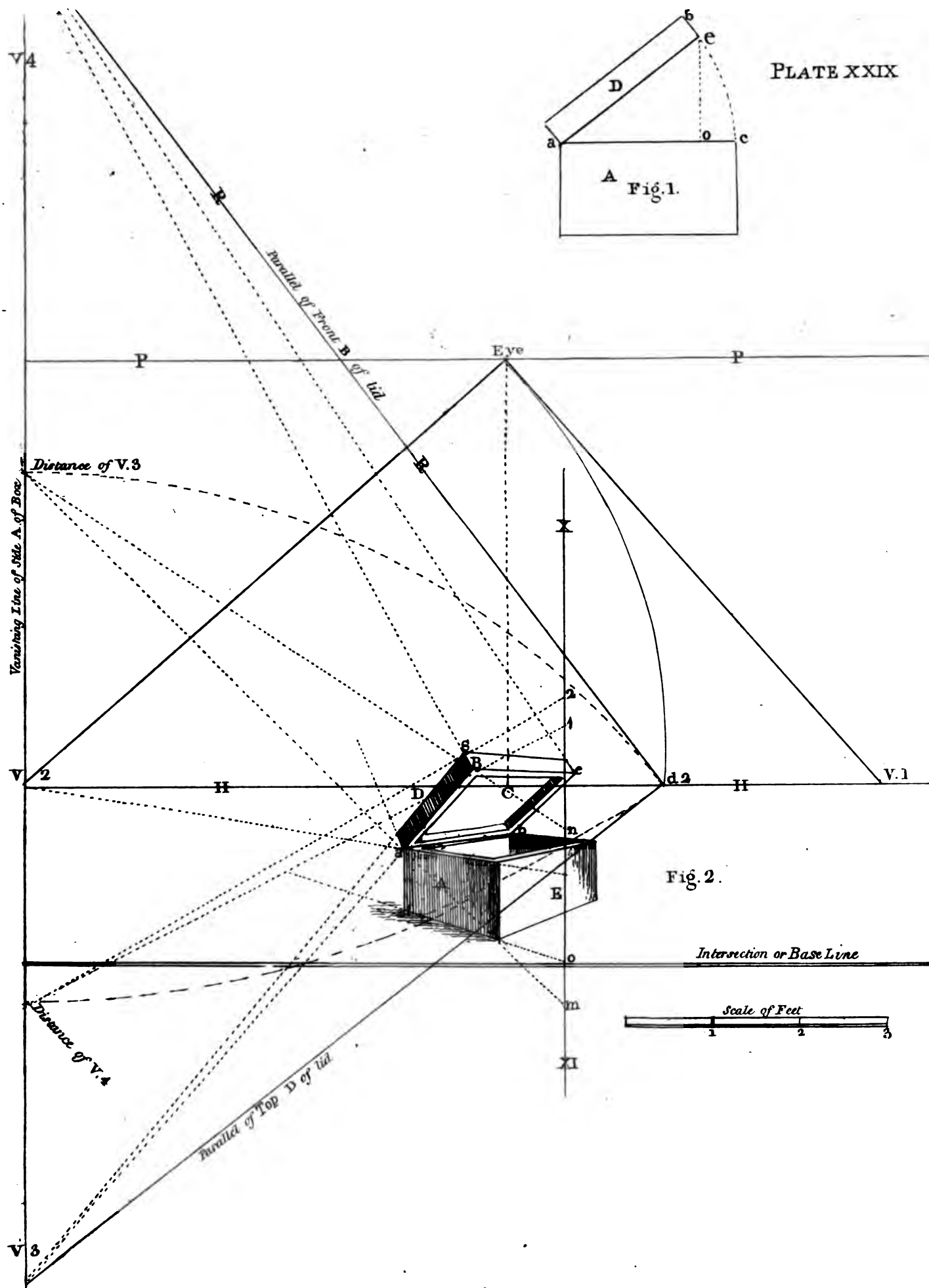
Therefore, from the point 1 draw a right line to the center of the picture; then take the distance of that point from the picture, 1 foot by the scale, or equal to the line 0 x 2, in No. 1, and set it on the base line from 1 to 2, and from 2 draw a line to the distance of the picture D P, which will intersect the line that is drawn from 1 to the center of the picture in the point a; consequently a is the perspective representation of the nearest angle of the block, which touches the ground.

Observe, that D P is the distance of the picture brought down to the horizontal line; by the scale it is 6 feet; it is the same measure from the center with the point marked *Eye*.

In this Example, there is a line marked vanishing line, of face B of block. This vanishing line is found as follows:

V 2 is the vanishing point for the lines k y and m n, which are inclined to the picture only; and V 3 is the vanishing point for the







lines  $k m$  and  $y n$ , which are inclined to the horizon and also to the picture: now all these lines are in one plane; consequently, a line drawn through the vanishing points of those lines, will be the vanishing line of the face  $B$ , that face being a plane in which those lines are seated.

SECT.  
IV.  
Plate  
XXVIII.

*Box with open Lid.*

Plate XXIX. Fig. 2, contains an Example of a box with the lid open, every side of which is inclined to the picture, and the lid inclined also to the horizon.

PLATE  
XXIX.

The lower part of the figure is given in Fig. 1, Plate XV, in the third or foregoing Section, that this part of the example might not be encumbered with an excess of lines: therefore, having drawn the lower part  $A E$  by the instructions before given, proceed to complete the lid as follows:

Fig. 1, represents the geometrical profile of the box with the lid open— $A$ , being the body of the box, and  $D$ , the lid.

In Fig. 2, the horizontal line is marked  $H H$ .

$C$  is the center of the picture,  $V 1$  and  $V 2$  are the vanishing points for the sides of the box, as found in Fig. 1, Plate XV.

Through the vanishing point  $V 2$ , draw the line  $V 3, V 4$ , perpendicular to the horizontal line, which will be the vanishing line for the sides  $A$  and  $D$  of the box and lid.

At the point  $O$ , which is the intersection of the side of the box with the ground line, draw the vertical line,  $X, X 1$ , which must be considered as the intersection of the side  $A$  of the box, with the picture.

Find the vanishing points for the side  $D$ , and also for the front  $B$  of the lid, as follows:

Bring down the distance of the vanishing point  $V 2$  to the horizontal line, as at  $d 2$ , as was done for finding the measure of the lower part of the box in Plate XV.

$C c 2$

At

SECT.  
IV.  
Plate  
XXIX.

At the point d 2, construct an angle with the horizontal line, equal to the angle of inclination of the lid of the box with the horizon; or, which is the same thing, draw a line through the point d 2, parallel to the lid of the box, Fig. 1, till it cuts the vanishing line V 2 at V 3: then will V 3 be the vanishing point for the lid of the box, which is inclined to the horizon.

At the point d 2 draw another line perpendicular to the line d 2, V 3, till it intersects the line V 2, V 3, at V 4; then will V 4\* be the vanishing point for the angles B S, a, and e of the lid of the box.

Having found the vanishing points V 3, V 4, bring down the distances of those points into the vanishing line V 2, V 4, as is marked at their points.

Thus, with the compasses upon the point V 4, take the length of the line or radial R R to the point d 2, and mark it upon the vanishing line V 2, as at the point marked distance of V 4.

Then repeat the same at the point V 3, which will give the point marked distance of V 3.

Having thus found the vanishing points and their distances, proceed to form the lid as follows:

Through the angle a of the box draw a right line from the vanishing point V 3, as the line a B, which will represent the lower line of the side of the lid.

From the distance of the vanishing point V 3, draw a line through the angle of the box, at which the lid is hinged, as at a, and continue the line till it intersects the line X, X 1, as at m;—then from m set up on the line X, X 1, the measure of the side of the lid to n, equal the measure a c or a e in Fig. 1; and from n draw a right line to the distance of V 3; and the intersection of that line with the line a B will give the apparent dimension of the side of the lid of the box, as at B.

\* The vanishing point V 4 is beyond the limits of the Plate.

Having

Having thus found the point B, which is the outer angle of the lid, from B draw a line to the vanishing point V 1, as the line Be.

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XXIX.

Then, from the point V 3 draw a line through the further angle b of the box, till it cuts the line which is drawn from B to V 1; and the intersection of those lines at e will produce the general form of the inside of the lid.

\* From the points B, e, and a, draw lines to the vanishing point V 4, which will give the angles of the thickness of the lid.

To obtain what may be called the depth of the lid, or its dimensions at the angle S B in Fig. 2 (which represents b d, in Fig. 1), proceed as follows:

From the distance of the vanishing point V 4, draw a right line through the point B till it cuts the line X, X 1, in the point 1; then from 1 set up to 2 the measure of the thickness of the lid equal b e, Fig. 1; and from the point 2 draw a line to the *distance* of V 4;—and its intersection with the line which is drawn from B to the vanishing point V 4, as at S, will give the apparent thickness of the lid.

Complete the general form of the lid, by drawing lines from the points B and S to the vanishing point V 3, and also from the angle S to the vanishing point V 1; after which the interior thickness of the lid must be found.

The thickness of the border of the lid corresponds with the thickness of the lower part of the box: therefore, having found the thickness of the lower part, as directed in the explanation of Fig. 1, Plate XV, the upper part must also be constructed by the assistance of that thickness which is already found.

For which purpose continue the interior lines of the side A, and its opposite, till they cut the back line of the box a, b, and through those points draw lines from the vanishing point V 3, which lines

\* It is almost needless to observe, that the angles a, b, e, B, of the lid coincide with the angles of the lower part of the box, when it is shut down.

will

SECT. IV. will give the thickness of the sides of the lid; after which find the thickness of the front and back of the lid, as follows:

Plate  
XXIX.

\* At the points m and n on the line X, X 1, set on the measure of the thickness of the lid, as from m towards o, and from n towards E; and from those points draw lines to the distance of the vanishing point V 3; and those lines will intersect the line of the lid a B, and mark the thickness both of the front and the back of the lid.

From those points of intersection draw lines to the vanishing point V 1, and they will give the appearance of the interior dimensions of the thickness of the sides of the lid.

It must be observed, that there are three vanishing points absolutely necessary for the construction of the lid, they are V 1, V 3, V 4.

V 1 is the vanishing point for all those lines in the lid which are *parallel* to the horizon, and V 3, V 4, for those which are *inclined* to the horizon.

The vanishing line of the side of the box, which is marked in the Plate by its appellation, is the vanishing line in which all the vanishing points for the lines in the side D of the lid, and also of the side A of the box, must be found; for the lines a B and D S must be considered as being all in the same plane with the side A.

Thus V 2 is the vanishing point for the lines in the side A, which are parallel to the horizon, and V 3 and V 4 for those which are inclined to it.

It is found thus: The radial or line that passes from the eye to V 2 is parallel to the original of the side A, and cuts the picture at V 2. Now this radial must be considered as a line in a vertical plane; con-

\* Neither the points which are proposed from m and n, nor their intersections on the lid, are marked on the figure: some others are also omitted, that the diagram might not be too much confused. For the author is convinced that the rest will be easily discovered, provided those which are given are properly understood by the student: but should there be any difficulty, let him apply a ruler or straight edge to the different points and lines, and he will soon find out their direction and use.

frequently,

Establishing line of front





frequently, such vertical plane will cut or intersect the picture in the line that is drawn from V 3 to V 4. But this plane cannot be applied in operation; but as it is known to be a vertical plane, its intersection will be *perpendicular* to the horizon; therefore, the line V 3, V 4, is drawn through the point V 2, *perpendicular* to the horizontal line H H.

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\* By the term *intersection* is commonly meant the ground line, or base line of the picture; but the term is equally applicable to other lines in the diagram; for if any *original* plane, whether vertical, inclined, or horizontal, be produced or continued forward to the picture, the line in which such plane cuts it will be the intersection; and it is upon such line that all measures must be applied, to determine the proportionate magnitudes of the parts in the plane producing that intersection.

Thus in Fig. 2, Plate XXIX, the side A of the box, if continued or brought forward, cuts the picture in the line X, X 1; therefore, that line is the intersection of the picture by the side A of the box, equally so with that which is produced by the ground or plane upon which it stands, and which in the Example is marked *intersection* or *base line*.

It must be remembered, that the intersection of every plane is parallel to its vanishing line. Thus the line commonly called the ground line or base line, is parallel to the horizontal line: therefore the vanishing line of any plane may be considered as the horizontal line, and the intersection of that plane as the ground line.

#### *Demonstration.*

Turn the Example Plate XXIX, so that the words *vanishing line of side A of box*, may stand in the regular order; then consider that

\* See Page 24.

SECT. line as the horizontal line, and the line X, X 1, which is parallel to  
 IV. it, as the base line: the point V 2 is the center of that vanishing  
 Plate line, and the points V 3 and V 4 are vanishing points for lines, in  
 XXIX. the plane A or side of the box; and the length of the line which is  
 drawn from V 2 to the point marked *Eye*, is the distance of the  
 vanishing line of the side A of the box.

*Of the Pediment on a Building, the Front of which is inclined to  
 the Picture.*

Example, Plate XXX.

PLATE This figure, although not abstruse in theory, is difficult in practice.  
 XXX. It is extremely useful to the painter and architect, yet the perspective  
 arrangement cannot possibly be understood without a previous ac-  
 quaintance with the principles of architecture; nor should it be  
 attempted until the student has well considered the Examples already  
 given of mouldings situated in the different directions of parallel  
 and inclined to the picture, as demonstrated in Examples, Plates IX,  
 X, and XXVI.

As it is necessary that the student should have a clear and accurate  
 knowledge of the architectural form of the pediment, before he  
 attempts to draw it in perspective, it will be necessary for him to  
 understand its geometrical construction; for which purpose the  
 Example Fig. 1, Plate XXXVI, is given.

That figure represents half the cornice and pediment which sur-  
 mounts a building, and is exactly similar in construction to the  
 Example in Plate XXX.—It is drawn by the following process:

First determine the breadth of the erection or building, upon which  
 the cornice is placed, and then draw the mouldings or members with  
 their projections or profiles, as A B; which in the Example consists  
 of

of a cima recta A, the fascia or corona B, with the cavetto K, beneath.

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XXX.

The student must observe, that when there is a pediment, the cima recta is omitted in the execution of the horizontal part of the cornice, and is only admitted upon the inclined or sloping part, called the pediment; yet it must be marked in the drawing, as is done in the Example, by occult or dotted lines; because, if this member be not described, the inclined parts cannot be determined\*.

After having drawn the cornice, with the projection of its members, divide the whole length from C to the other extreme, into nine equal parts; and having drawn the line a b, perpendicular to the line o X C, and in the center of the pediment; set up from the point O, two of the nine parts, as from O to b: then is b the summit or apex of the pediment: therefore from B draw a right line to the extreme of the cornice C, and the line b C will be the upper edge of the inclined part of the pediment.

Then determine the breadth of the members of the inclined part, as follows:

Draw a right line perpendicular to the upper raking line b C of the pediment, as the line X, X 2, and continue it through the cornice, as at 6, 7; then take by compasses the depth of the horizontal mouldings of the cornice, as they appear upon the line X, X 2, from 7 to b, to 1, and to 6; and transfer those measures from the upper raking line b C of the pediment *downwards* upon the line X, X 2, from 9 to 8, which gives the whole depth of the inclined members of the pediment; which must be again divided by the same process

\* In the Example no more than half the pediment is given; but the entire general form of a pediment may be seen in Plate V. Fig. 3, where the whole length of the upper horizontal member a b, is divided into nine equal parts, two of which are set up for the height from 3 to c. It may be considered as more geometrical to observe, that the inclination of the raking members of a pediment form angles of  $24^{\circ}$  with the horizontal part; but this proportion is sometimes varied, as circumstances may require.

D d

for

SECT. for the finall members; through which divisions, draw lines parallel  
 IV. to the line b C, and the geometrical form of the pediment will be  
 Plate completed.  
 XXX.

*Process for the Perspective Representation.*

Draw the geometrical form of the pediment upon a separate paper, as Fig. 1, Plate XXXVI.

Then determine the general form of the building perspective, as A B, Plate XXX. the vanishing lines and points for which are as follows :

The base line is marked A G.

H H is the horizontal line.

C is the center of the picture; which is marked Center.

V 1 is the vanishing point for the front A B; and d V 1 is its distance.

The vanishing point of the side F is out of the plate; but its distance is marked d V 2.

N is the vanishing point for the mitre line; but its distance is out of the plate on the left hand.

The vanishing line of the front A B is marked by its title; it passes through the vanishing point V 1, perpendicular to the horizon; in which line the point V 3 is the vanishing point for the raking or inclined members D of the pediment; which point is determined by the rules given for the Example Fig. 2. Plate XXVII.

The other vanishing point for the members, which may be considered as the declining part P, is out of the Plate, equally distant from the point V 1, with the point V 3, but below the horizontal line

These vanishing points being determined, and the front and sides being drawn according to the rules given for Figs. 1 in Plates XII. and

and XIII. Pages 102 and 106, consider the points S and Q as the upper angles in the front of the edifice, round which the mouldings are disposed; the profile of which in the nearest angle T, must be drawn by the process given in Page 177, for the Example in Plate XXVI. therefore, by the same methods complete the horizontal mouldings M and the angle T.

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Plate  
XXX.

The line A S being the angle of the building, and S the point which terminates its height without the pediment, continue the line A S to any convenient height, and set up from S to b the whole height of the pediment, equal the height from O X to b, in Fig. 1, Plate XXXVI.

Then from b set downwards towards S the depths of the different members c d e, equal to the geometrical measures b c d e, in Fig. 1, Plate XXXVI.

Find the point m, which is the middle of the base line of the building, and through m draw the line w o, tending to the vanishing point of the side F, which is out of the plate.

Then from d v 2, which is the distance of the fore-mentioned vanishing point, draw a right line through the point m, and continue it till it intersects the ground line at the point 6; from which point set on upon the base line the projection of the mouldings, as to 7, 8, 9, equal to the projections of the geometrical profile, marked with similar letters, Fig. 1, Plate XXXVI. and from the points 7, 8, 9, draw lines to the point d v 2, that may intersect the line w o in the points w, x, y; from which points draw lines perpendicular to the horizon, as w K, x I, y r, and m n.

Note, the line m n represents the middle of the front A of the building; consequently, the point f is the summit of the pediment upon the face of that front.

From the points b, c, d, e, in the vertical line A b, draw right lines to the vanishing point V 1; which lines will intersect the line m n,

D d 2

in

SECT. in the points f, g, h, and L; through which points draw right lines  
 IV. from the vanishing point of the side F of the building (but which,  
 Plate as before observed, lies out of the plate) that may intersect the per-  
 XXX. pendicular line w K, and the other perpendicular lines in the points  
 K, I, r, L, which points determine the projection of the mouldings  
 of what may be called the apex of the pediment.

Therefore, from the vanishing point V 3, draw lines through the  
 points K, I, r, L, to the various angles of the mouldings in the profile  
 T, which will express the members of the inclined part D of the  
 pediment.

Again, from the same points K, I, r, L, draw lines to the vanishing  
 point \* of the declining part P of the pediment, which will  
 complete its form.

It must be observed, that the contour of the curved mouldings at  
 the angle of the pediment, must be drawn by hand; for any attempt  
 to delineate them by rule would be vain and useless.

This Example is given as the last which can be useful to the artist;  
 therefore this Section shall be closed with it, together with some  
 observations upon up-hill and down-hill views; their constructions  
 being founded upon the principles contained in this Section.

It is unnecessary to apologize for omitting the regular solids, seeing  
 that they are of no use to the artist, and are at best no more than

\* This vanishing point lies below the horizontal line, in the vanishing line of the  
 front E, at an equal distance from the point V 1 with the point V 3; how these points  
 are obtained, has been already shewn; yet the process shall be here repeated.

V 1 is the vanishing point of all the horizontal lines in the front E of the building,  
 and the line X passes through it perpendicular to the horizon: consequently, it is the  
 vanishing line of the front E of the building. The point d V 1 is the distance of that  
 vanishing line; therefore at the point d V 1 construct an angle on the line H H, equal to  
 the inclination of the pediment to the horizon, as the angle U W Z, and the line W U  
 continued, will intersect the line X in the point V 3, which is the vanishing point  
 required.

The lower vanishing point for the declining part of the pediment P, may be found by  
 making the same angle at the point d V 1, but below the horizontal line; though it will  
 be sufficient to take the measure from V 1 to V 3, and set it downwards from V 1 on the  
 line X, continued below the ground line.

curious inquiry. Yet if any one should chuse to study their construction, he will find ample instruction in the elaborate Work of Mr. Hamilton, and some good diagrams in the elder Malton's Treatise, which will gratify the curiosity of those who chuse to pursue the study of Perspective through all its intricacies. Yet they will by no means improve the artist in the useful part of the science, beyond what may be acquired by the Problems of this and the foregoing Sections.

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*Of the Representations of Up-hill and Down-hill Views.*

In terminating the instructions for the last Example, which treats of a pediment the front of which is inclined to the picture; it was observed, that all which is necessary to the artist in the science of Perspective, was concluded by that Problem; but as some hints concerning up-hill and down-hill views were also promised in that conclusion, it will be proper to offer some instructions, which must be considered as elementary principles for the conduct of the artist in the delineations of up-hill and down-hill views in landscape. At the same time it must be remarked, that this subject is among the many which Dr. Brook Taylor says, must be assisted "by a good judgment, founded on much observation; it being difficult to bring every thing to exact mathematical construction, at least so as to be convenient for practice\*." On this account nothing more than general hints can be offered, which the artist must apply to his use as occasion may require; at all times paying attention to the following circumstances:

First, The positions of planes, whether inclined to the horizon or declining from it, cannot be easily distinguished from each other by the spectator, unless some vertical object or horizontal plane inter-

\* See his first edition, 1715, page 31, of Linear Perspective.

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XXX.

vene, by which a comparison of their positions can be made; for if it were possible that a descending plane or declivity could be seen without the horizon, it would not strike the eye of the spectator with any other effect than that of being perfectly horizontal; the same equivocal appearance takes place also in the case of the ascending plane or acclivity.

It is not necessary to offer a geometrical demonstration of this fact, as common observation will prove the truth of the assertions, however paradoxical they may at first sight appear.

Secondly, All buildings and edifices of every kind must have their *elementary* parts perfectly vertical and horizontal, otherwise they will fall, or be useless by their construction\*.

Thus a house built on the declivity of a hill, must have its walls vertical, and the floors perfectly horizontal, together with the tops and sills of the windows, and the ornamental fasciæ of the front; yet the ground or plane upon which the building stands, may be inclined to the horizon, either ascending or descending.

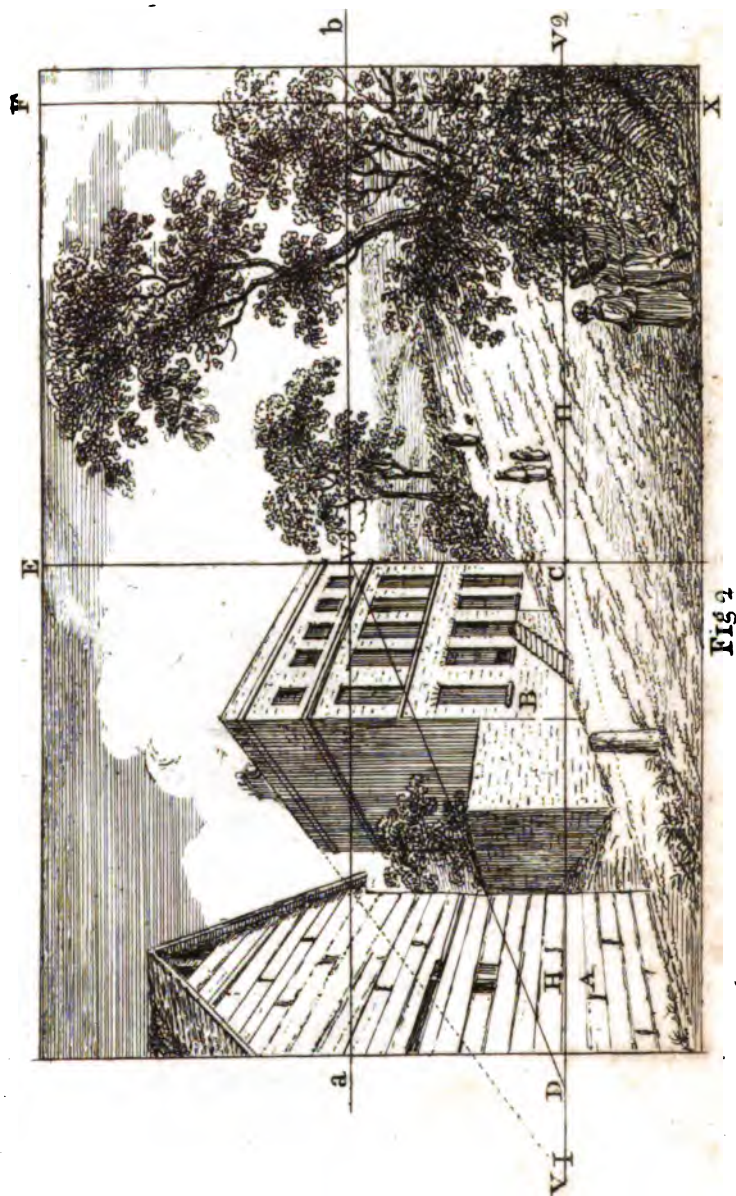
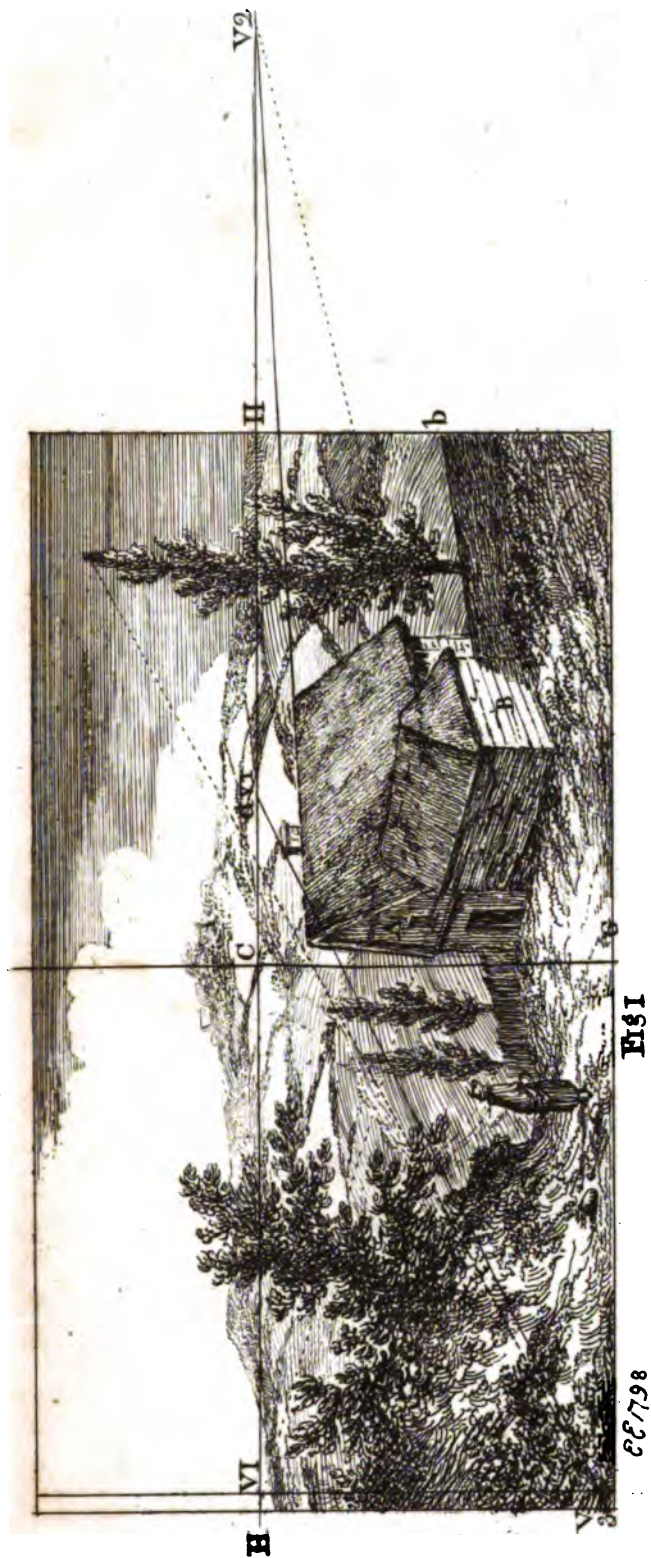
Thirdly, Although declining or descending planes have their remote parts below those which are nearest to the spectator's eye, yet do those remote parts, when represented upon the picture, appear higher, or above those which are nearest to the picture. Thus the descending part of a flight of stairs, when represented upon the picture, will have the lowest step marked above the representation of that which is the nearest and highest†, and this will ever be the appearance when the eye of the spectator is above the *declining* plane. On the contrary, when an *inclined* plane is above the eye of the spectator, then the farthest or highest part of the original plane will in the representation often fall below the part which expresses the nearest and lowest

\* There are some buildings which are pyramidal, others conical in their exterior forms; yet such must have their bases perfectly horizontal.

† See an excellent Example of a staircase, in Malton's Treatise on Perspective, Plate XXXI. where this effect is well illustrated.

parts







parts of such inclining plane It is thus in Example, Fig. 2, Plate III. in which the house C, X 2, has the roof R inclined to the horizon, the farthest point of which, at the point W, is in the original object much higher than the nearest part marked Z, yet in the representation upon the picture, the highest part w is below the angle Z, which in the original object is the lowest.

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III.

The author has given these remarks, because it is necessary that the student and artist should impress their minds with these important facts, though they may not perfectly understand the theory by which such phenomenæ are produced.

In the process of drawing views, where the general face of the country is nearly horizontal, the ground line or base line should be first of all determined, and then the horizontal line should be drawn at a certain height equal to the height of the eye of the spectator, above the ground upon which he stands; but in drawing down-hill views, it will be proper to draw the horizontal line first, and then determine the base or ground line below it; and this course of operation is founded on the following circumstances:

When a spectator stands upon the declivity of a hill, and looks directly forward, he cannot see any part of the declining plane, but such as will be at a much greater distance from his station, than if the plane upon which he stood were perfectly horizontal\*; consequently the portion of the picture will be greater below the horizontal line in the down-hill view, than in that which represents the level country.

*Operation for the down-hill View.*

Plate XXXI. Fig. 1.

First draw the horizontal line H H, so disposed upon the paper or

\* It is for this reason that the difference of process is recommended; for in all other views, it should be the invariable practice of the artist first to mark the ground line or base line of the picture, and then the horizontal line, at the proper height above it.

canvas,

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canvas, as may best correspond with the apparent height of the horizon, in the natural view; and determine the center of the picture, C.

Then find the vanishing points of the sides of the various buildings which may be required in the view, by the process directed in the Third Section, Page 97, as the points V 1 and V 2; which are the vanishing points of the sides A and B of the house; observing, that all its sides or faces are inclined to the picture.

Through the vanishing point V 1, draw the vertical line V 1, V 3, which will be the vanishing line of the sides A A of the building.

Bring down the distance of the vanishing point V 1, to the horizontal line, as at d v 1, and at that point construct an angle with the horizontal line, *but below it*, equal to the known or supposed declination of the ground, and draw a right line, as the line M, which being continued will cut the vertical vanishing line V 1, at the point V 3; consequently, V 3 is the vanishing point for the declivity of the hill.

These points being obtained, let all the constructive lines of the house, and barn, be determined by the vanishing points V 1, V 2, which being in the horizontal line, are the vanishing points for all the horizontal lines in the sides of those buildings which are inclined to the picture: but the fences or walls b and d, have their upper edges parallel to the hill upon which they stand; therefore they vanish in the point V 3. And as the three trees are in a line parallel to the fence, and are all supposed of equal heights with each other; their heights are determined by drawing a line from the summit of the nearest, to the vanishing point V 3.

*Of the ascending or up-hill View.*

Plate XXXI. Fig. 2.

This Example contains two buildings, a barn, marked A, and a house,

house marked B ; the former hath the side A, perpendicular, and the latter hath its sides B E, inclined to the picture.

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XXXI.

*Process.*

Draw the horizontal line H H at the common height above the base or ground line, and let C be the center of the picture.

As the hill in this Example is supposed to be a regular ascending plane, the base or lower line of which is parallel to the picture, proceed as follows :

Through the centre of the picture C, draw the prime vertical line E C, and let D, upon the horizontal line, be the distance of the picture.

At the point D draw a line, which shall make the same inclination with the horizontal line, that the hill or ascending plane is known or supposed to make by its ascent with the natural horizon, and the interfection of such inclined line with the prime vertical line, as at V 3, determines the vanishing point for lines that express the direct ascent of the hill—Therefore, through V 3 draw the line a b parallel to the horizontal line, then will the line a b be the vanishing line for the up-hill or ascending plane\*.

The house or building B, inclines to the picture, and V 1, V 2 are the vanishing points of all the horizontal lines in the sides of that building ; which vanishing points are found as directed in the foregoing Section. See Plate XIII. Page 106.

Through the point V 2, draw the vertical line X F, and its interfection with the line a b (which is the vanishing line of the ascending plane) will give the vanishing point for all those lines which lie in the ascent of the hill, and are parallel to the front B of the house, which is inclined to the picture.

\* The angle V D C is equal to the angle which the ascent of the hill makes with the horizon ; consequently the line D, V 3, is parallel to the acclivity of the hill.

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XXXI.

It would be an endless task to attempt further directions for delineating the smaller parts of the foregoing figures, nor would it be useful, since those who understand the preceding, together with the former part of this Section, will easily comprehend the principles upon which ascending and descending views are delineated; and it must be again repeated, that without such preparatory knowledge, the most minute and accurate instructions cannot be understood by the student. Yet the following observations will be found useful to those who are but little informed in the science.

In all descending views, although there may be no rising ground after the hill terminates upon which the spectator stands, yet the level plane that lies below will appear to ascend or rise toward the horizontal line, which passes through the eye of the spectator. This phenomenon hath sometimes deceived intelligent persons, who, viewing distant objects from elevated stations, have supposed that those objects stood upon elevated ground, when in fact they were upon the lowest that could be seen in the view.

On the contrary, when a spectator approaches ascending ground he is often struck with the idea of its being less elevated than it really is; but this deception is caused by the plane of the ascent passing through the eye of the spectator, by which circumstance the elevation cannot easily be perceived.

These last observations may be considered as theoretic, and the student will do well to consider them with attention, and to compare these precepts with the appearances of nature, which in this case, as in all others, will furnish him with the best Examples for his study and consideration.

END OF THE FOURTH SECTION.

## SECTION THE FIFTH.

*Of Shadows.*

**I**T was not originally the author's intention to give any instructions in this work relative to shadows, because it seldom happens that the painter is required to represent the determined shadows of the buildings which form the back ground of his picture: for this reason some writers on the Science of Perspective have omitted to give any rule concerning shadows.—\* One in particular has the following observation: “The geometrical or perspective knowledge of shadows “ is of very little consequence to a painter: it is easily understood, “ when we have learned that of objects.”

Although there is much truth in this remark, yet, in the painting of scenes, and in executing perspective drawings of architecture, the correct representations of the shadows will ever be required; it was therefore thought necessary to add this Section, that the work might not be considered as imperfect by those who should require instructions upon the subject of shadows.

\* The Practice of Painting and Perspective made easy by Thomas Bardwell, Painter, quarto. The patent for this work is dated in January 1756. There was a second edition 1773.

SECT. *the spectator*; for then the shadows of all right lines that are vertical will be projected *from* the spectator. Example, Plate XXXIII. Fig 2, and Plate XXXIV. Fig. 2.

To the foregoing observations the following may be added, which may be considered as Theorems.

Theorem 1st.

The shadow of every *right line*, when cast or projected by the sun upon a plane, is a right line, unless the line is parallel to the ray of light, and perpendicular \* to the plane of projection; for in that case the shadow will be no more than a point.

Theorem 2d.

The shadow of a *plane* is also a right line, whenever the original plane producing that shadow is parallel to the sun's rays, and perpendicular to the plane of projection; but if oblique to either, the shadow will then be a trapezium.

Theorem 3d.

The shadows of all right lines, when projected upon planes that are parallel to them, have the same vanishing points with the lines themselves. Thus the shadow lines *ef* and *89*, vanish into the same points with the lines *g, h* and *k i* which are the original lines producing those shadows. Plate XXXIX. Fig. 6.

*To determine the Representations of Shadows, when the Sun's Rays are parallel to the Picture.*

Plate XXXIX.

Suppose the block *a*, to be already drawn, with the face or side, a parallel to the picture.

In this and the following Example the shadows are projected toward the right side of the spectator; therefore continue the lower

\* By the plane of projection is meant any plane upon which the shadow is cast or projected.

line



line of the block from s to e, and at the upper angle g draw the line v 2, making the same inclination with the horizontal line that the sun's rays are known to make with the natural horizon; and the intersection at e will determine the shadow of the face a, upon the ground. From e draw a line to C, which is the vanishing point of the side of the block; and then draw the line v 1 parallel to v 2, which will determine the shadow of the other angle. The line v 1 may be omitted, provided a line be drawn from the farther angle d parallel to the line s e, till it intersects the line e f, at f.

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XL.

*Block b, Fig 6:*

The block b has all its sides inclined, while the sun's rays are parallel to the picture; therefore at the nearest angle s, draw the line s 6 parallel to the base line, and through the upper angle d, draw the line v 4 with the same inclination to the horizontal line that the sun's rays incline to the natural horizon; and its intersection at 6 will determine the length of the shadow of the nearest angle of the block.—From the point 6 draw a line to the vanishing point V. 2, which is the vanishing point of the shadowed side of the block. Then draw v 3 parallel to v 4, which will give the intersection 8, and from 8 draw a line to the vanishing point V 1; and from the point 7 in the indicated \* plan of the block, draw a line parallel to the base line, which will give the intersection 9. Thus will the lines be obtained which form the boundaries of the required shadow.

In the Example the inclined line v 4, which represents a ray of the sun, passes through both the points k and d of the block, and thereby marks the shadows of both those points on the ground by one line only, as at 9. But this is an accidental circumstance; for had the object been more or less oblique to the picture, it might then have been

\* It is frequently necessary to find the perspective representation of the *plan* of the object, without which the shadow cannot be completed.

necessary

SECT. V. necessary to draw another ray through k; but as the line producing the required shadow is vertical, a line drawn parallel to the base of the picture from the point 7, which is the remote angle of the plan of the block, will be the shadow required, as the line 7 9; and therefore a third ray would be superfluous.

Plate XL.

In Plate VIII. Fig. 1,

PLATE VIII. Is the Example of a stool, the shadow of which is projected upon the floor by rays parallel to the picture.

The line L a, indicates one ray of light, to which the others are all parallel.

At the points c e and d f, which are the fronts of the legs of the stool, draw lines parallel to the base line of the picture, and continue them as far as may be supposed necessary.

Then at the upper angles of the stool, as at V and x1, draw lines parallel to the given ray L a; and those lines will intersect the line c e at b, and the line d f at a; which two points being joined by a right line, will give the shadow of the edge of the stool V, x1, upon the floor, expressed by the line b a\*.

It must be observed that the thickness of the upper frame of the stool is to be comprehended in the shadow:

The thickness of this rail is marked at o, from x2; therefore, through o draw a right line parallel to the given ray L a, which line will produce the point g; from which point draw a line to the center of the picture C, and the outlines of the shadow of the upper surface of the table will be determined.

\* Let it be observed, that if either of the points a or b be found, the shadow of the whole line will be determined by drawing a line from C, the center of the picture, through a or b: for as C is the vanishing point of the edge V x1, of the stool, it must also be the vanishing point of the shadow of that edge, seeing that they are parallel to each other, and consequently have the same vanishing point. Theorem 3, page 214.

Fig 3.

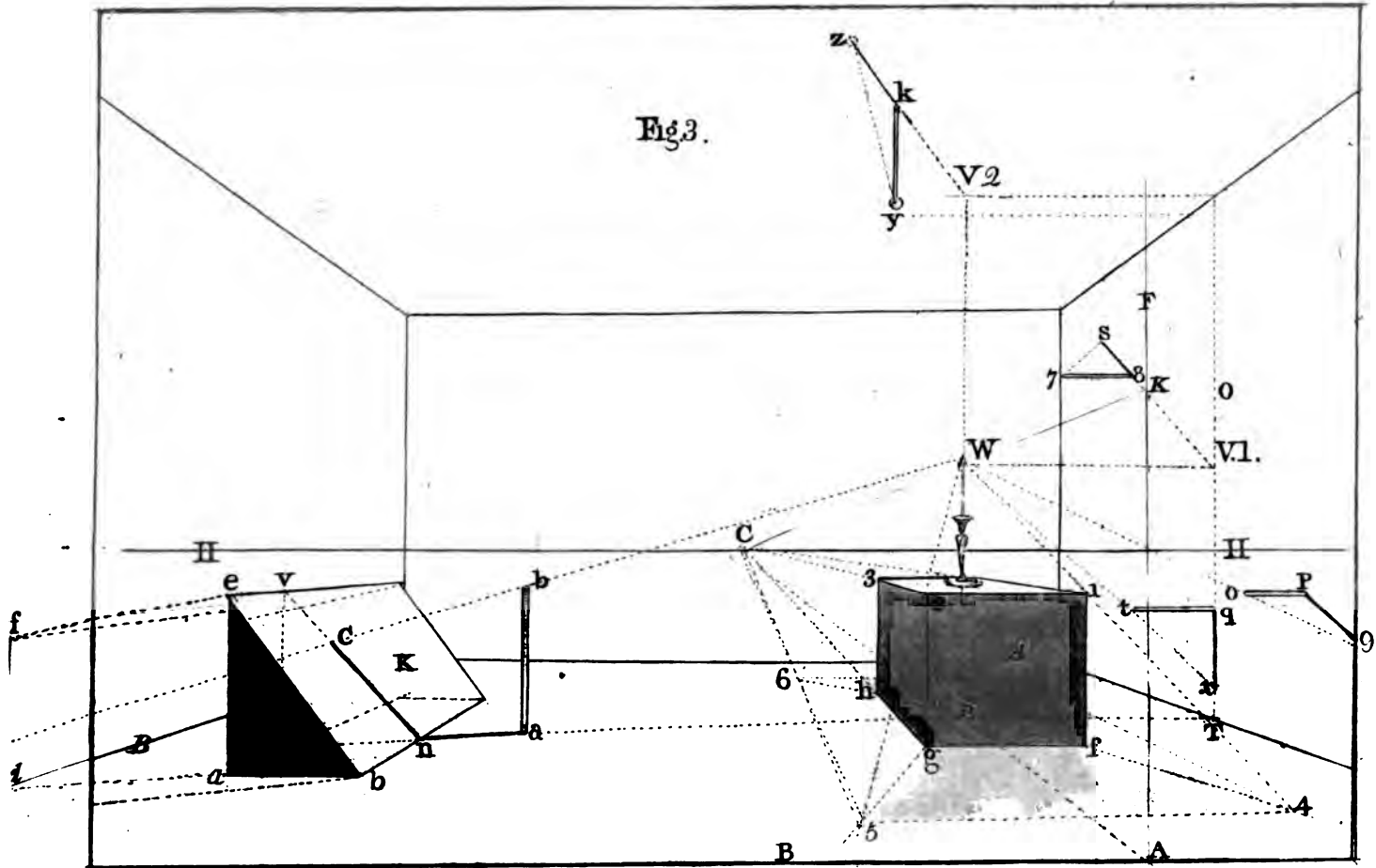


Fig 2

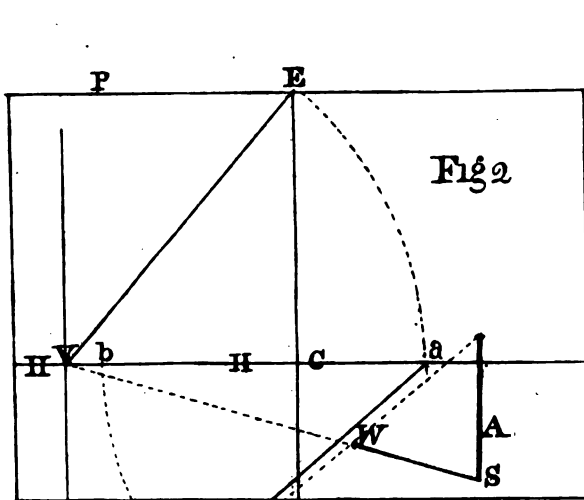


Fig 1

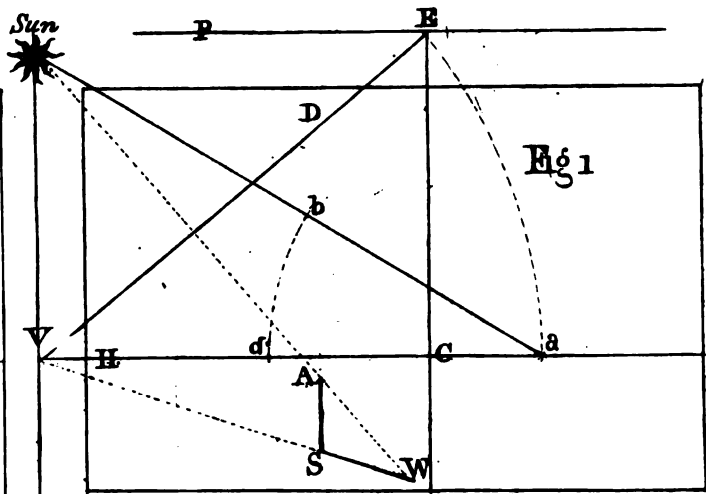
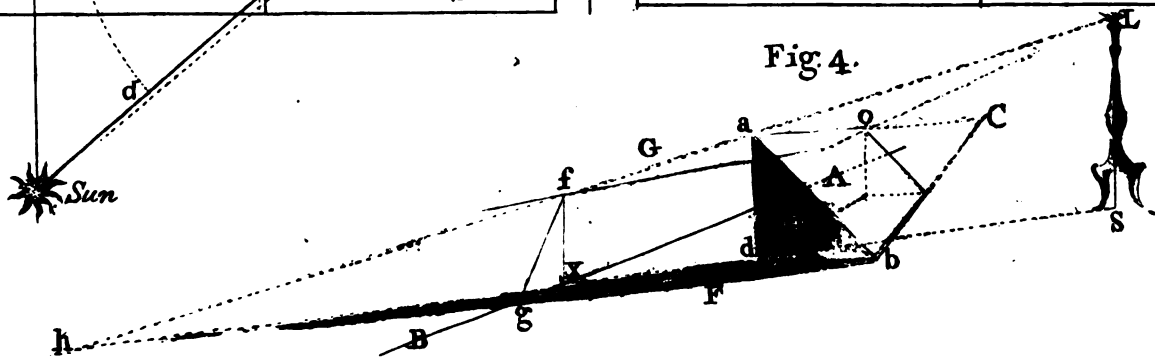


Fig 4.





For the shadows of the side rail and stretcher, the same process must be employed with that already taught, which it is unnecessary to repeat, as the student will readily understand the construction, by laying a parallel ruler to the line *L a*, which represents the given ray, and then moving it to the different points from which the shadows are projected in the Example.

SECT.  
V.  
Plate  
VIII.

*Rudiments of Shadows, when the Sun's Rays are inclined to the Picture.*

Plate XXXII.

PLATE  
XXXII.

Fig. 1 is an Example for demonstrating the method of drawing the shadow of a vertical line, as projected or cast upon the ground, when the sun is *before the spectator*, or which is the same thing, *behind the picture*. *A*, is the vertical line or rod, the shadow of which is required upon the ground.

*H* is the horizontal line.

*C* the center of the picture

The line *P E*, is the parallel of the picture.

\* In this Example the sun's rays incline to the picture in an angle of  $39^{\circ}$ .

Therefore at the point *E*, which is the eye, draw a right line which shall make the given angle with the parallel of the picture *P E*, equal  $39^{\circ}$ , as the angle *P, E, D*.

Continue the line *E D* till it cuts the horizontal line, as at *V*, then is *V*, the vanishing point in the horizontal line, of all shadows of

\* The student must pay particular attention to the disposition of the sun's rays, both in their inclination to the *picture* and also to the *horizon*; as the vanishing points cannot be found without considering this *double* inclination.

*F f*

vertical

SECT. vertical lines that can be projected upon the ground, or horizontal  
 V.  
 Plate plane; the sun's rays being inclined to the picture in the given angle  
 XXXII. 39 degrees.

Through the point V draw a line perpendicular to the horizon, as the line V Sun.

Then find the elevation of the sun's rays as follows:-

Bring down the distance of the eye E, from the vanishing point V, to the horizontal line as a; at which point make an angle *above* the horizontal line, equal to the sun's elevation; which in this Example is  $36^{\circ}$ , as the angle b, a, d. Continue the line a b till it intersects the vertical line V, which intersection will be the place of the sun, as is marked in the Example by the word, and V is its seat upon the horizon.

The foregoing operation being completed, let S A be supposed a rod, placed in the ground perfectly vertical, or in other words perpendicular to the horizon.

From the point V draw a right line through the point S, which is the seat of the rod, and continue it as far as may be thought necessary.

Then from the point of the sun draw another right line to the point A, the top of the rod; and continue it till it intersects the line V S in W, then will the line S W represent the shadow of the rod S A.

Fig. 2, in the same Plate, is an Example, representing the shadow when the sun is *before the picture*, or which is the same thing, *behind the spectator*.

H is the horizontal line.

C the center of the picture.

The line P E the parallel of the picture.

First

First determine the inclination of the sun's rays to the picture, as in the former Example, as the angle P E V.

SECT.  
V.  
Plate  
XXXII.

Then find the inclination of the sun's rays to the horizon, which in this Example is  $49^{\circ}$ .

Bring down to the horizontal line, the distance of the eye from the vanishing point V, as the point a, the same as in the foregoing Example.

Through the point V draw a line perpendicular to the horizon, and at the point a, construct an angle *below* the horizontal line equal the sun's elevation *above* the horizon, as the angle b a d, and continue the line a d, till it intersects the vertical line V at the point marked Sun.

The points V, and Sun, being thus found, let A S be supposed the vertical rod whose shadow is required.

From the vanishing point V draw a right line to the bottom or feat of the rod S, then from the top of the rod draw another right line to the point sun, which will intersect the line W S at W ; then is S W the shadow of the vertical rod A S, the sun being behind the spectator.

The two foregoing Examples demonstrate the first principles of shadows projected by the sun, when his rays are inclined to the picture ; and it must be observed, that in each there are two vanishing points employed. The first represents the place or body of the sun, the second its feat upon the horizontal line, which in both Examples are marked V and Sun.

In the first Example, the Sun is supposed before the spectator, on his left hand ; and consequently is seen in its real place : \* but in the

\* As this Problem, and some of the following, may appear confused by having the sun's body represented below the horizon, and even out of the picture, it may be proper, for the service of the student, to attempt some further explanation.

SECT. the second, the sun is supposed behind the spectator, on his right  
 V.  
 hand, and therefore cannot be seen ; for this reason, its place is trans-  
 posed below the horizon on the *left hand* of the spectator, and there-  
 by becomes a vanishing point for the rays that pass from the sun \*.

Plate  
 XXXIII.

*Of Shadows of Prisms or Blocks upon the Ground or horizontal  
 Plane.*

PLATE  
 XXXIII.

Plate XXXIII. Fig. 1.

In this Example the sun is *behind* the picture, or *before* the spectator; its place is marked by the word Sun; the process for finding which, shall be again repeated.

H is the horizontal line.

G the ground line, or base of the picture.

In this case, as in many of the Problems of the foregoing Sections, the plane of the picture must be considered as extended, not limited.

In the next place it must be remembered, the vanishing points may fall in any part of the picture, either above or below the horizon, as may be required ; all which circumstances have been already shewn in the second and third Sections of this Treatise.

When the sun is behind the spectator, he cannot be seen, as already observed, yet his imaginary representation may be obtained, which will be the vanishing point of his rays.

Suppose a spectator to stand at some distance from a plane perfectly vertical, which may be considered as a tablet for a picture; the sun behind him on the right hand, then imagine a ray of light to pass from the sun through the eye of the spectator, the line so passing would intersect the picture, and produce a point upon the picture, on the *left hand* of the spectator, and *below* the horizon; this point will be the vanishing point for *all* the rays that proceed from the sun, seeing that these rays being parallel among themselves, have one and the same vanishing point. Thus Dr. Brook Taylor's note is as follows :  
 " When the original luminous point is behind the spectator, so that it cannot have any  
 " real representation on the picture, its imaginary representation (which is as it were the  
 " shadow of the spectator's eye on the picture) must be on the contrary side of the  
 " plane to the point whose shadow is sought." Vide page 32, first edition.

\* Mr. Hamilton calls the transprojected image of the luminary a projecting point at an infinite distance behind the directing plane. See his Stereography, or complete Body of Perspective, Book v. Page 210.

P the



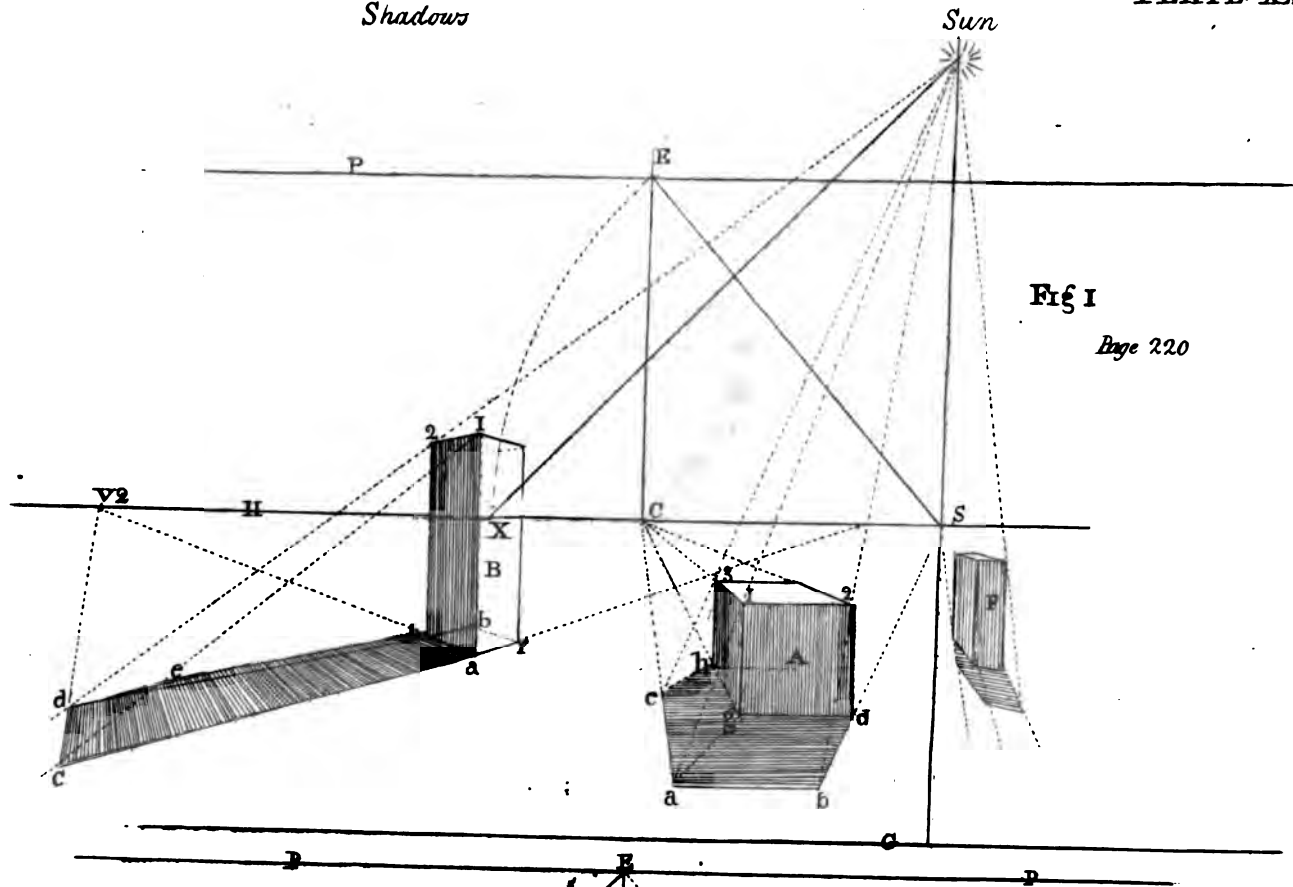


Fig 1

Page 220

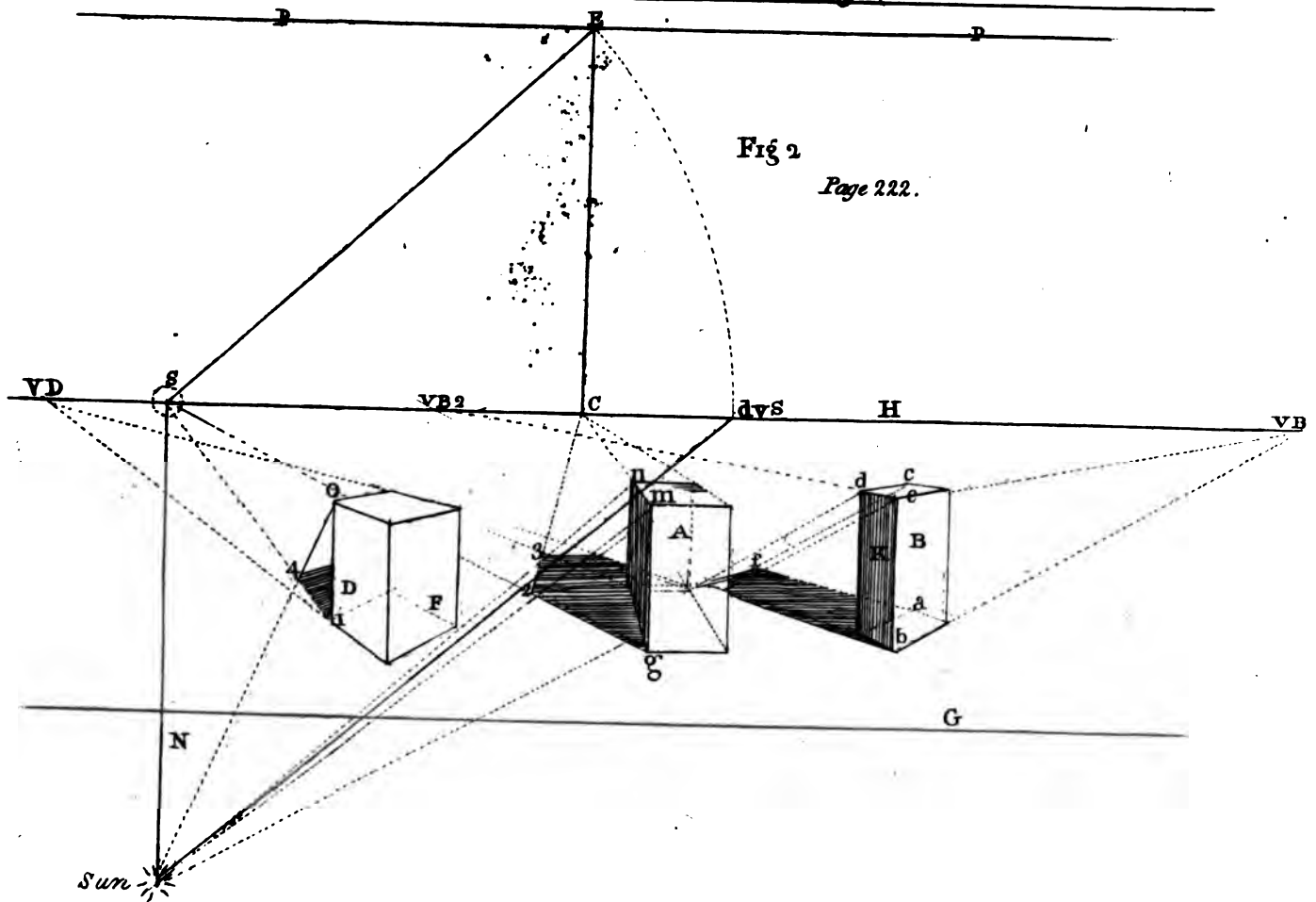


Fig 2

Page 222.



**P** the parallel of the picture.

**C** the center of the picture.

**E** the eye.

SECT.  
V.

Plate  
XXXIII.

At the point **E** draw the line **ES**, making the same angle with the parallel of the picture **P**, that the sun's rays are known or supposed to make with the picture, and at the intersection **S** draw the line **S** *Sun*, perpendicular to the horizon.

Bring down the length of the line **SE** to the horizontal line, as at the point **X**.

Then at the point **X** draw the line **X** *Sun*, making the same angle with the horizontal line **H**, that the sun's rays are known or supposed to make with the natural horizon; which will intersect the vertical line **S** in the point marked *Sun*, which is its place upon the picture; and **S** is its seat upon the horizontal line.

The block or cube **A**, hath its sides parallel and perpendicular to the picture; therefore the side **1 3** vanishes in **C**, the center of the picture.

**S** being the seat of the sun on the horizontal line, draw right lines from **S** through the lower angles **d g h**, as the lines **S d b**, **S g a**, **S h e**; and from the point *Sun* draw right lines through the upper angles **1 2 3** of the block, that may intersect the former lines at the points **a b e**; which points determine the extent of the shadow. Join the points **a b e** by right lines, and the shadow of the block **A** will be determined.

Observe, that **C** being the center of the picture and the vanishing point of the upper angle **1 3** of the block **A**; the shadow of that line, which is the line **a c** upon the ground, vanishes also in the point **C**.

The shadow of the block **B** is produced by the same process; that is, by drawing right lines from the point **S**, through the lower angles **a b d**,

SECT. a b d, and then determining the length of those lines by drawing  
 V. right lines from the *Sun* through the upper angles 1 2 3 which will  
 Plate produce the points e a and b.  
 XXXIII.

But as V 1 and V 2 are the vanishing points of the sides of the block B, the lines c d and d e vanish in those points: therefore, having found the point c, which determines the length of the shadow of the vertical line 1 a, from the point c draw a line to the vanishing point V 2, and from the point d draw a line to the vanishing point V 1, and the form of the shadow will be completed.

There need no further directions concerning the block F, as such would be but a repetition of the foregoing instructions.

Fig. 2, in the same Plate, is an Example of shadows when the sun is *before* the picture, or behind the spectator.

H is the horizontal line.

G the ground-line.

P the parallel of the picture.

C the center of the picture.

At the point E (which is the eye) draw the line E S, making the same inclination with the line P P, which the sun's rays make with the picture; and the point S will be the representation of the seat of the sun upon the horizontal line.

At the point S draw a right line perpendicular to the horizontal line, but below it, as the line S N.

Bring down the length of the line S E, from the point S to the horizontal line, as at the point d v s, and from that point draw a right line making the same inclination to the horizontal line (but below it) that the sun's rays are known or supposed to make with the natural horizon, as the line d v s, *Sun*; then will the point marked *Sun*, be the transprojected image of the sun upon the picture, and S its seat upon the horizontal line.

Therefore,

Therefore, to describe the shadows of the block B upon the ground, draw lines from its lower angles a b to the point S, which is the vanishing point for the shadows upon the ground of all the vertical line that compose the forms of the blocks or prisms.

SECT.  
V.  
Plate  
XXXIII.

The same process is employed for the shadows of the blocks A and D. From the lower angles of which lines are drawn to the point S, as from the angle g in the block A to S, and from the angle i in the block D to S. Then from the upper angles of the same blocks, as from c d e in the block B, from m n in the block A, and o in the block D, draw lines to the point marked *sun*, and the length of the shadows will be determined by the points 1, 2, 3, 4.

The methods for finding the representation of the sun's image, together with its seat upon the horizontal line, having been given twice in the foregoing Examples, that part of the process is omitted in the following instructions, the place of the sun being marked at pleasure, and the student may observe that he is at liberty to place the image of the luminary in any part of the picture that he thinks will produce the best effect, without attending to precise rules for its disposition; at the same time remembering, that the greatest elevation of the sun's rays in summer may be taken at 60, and the lowest in winter at 24 degrees.

*Shadows, Plate XXXIV.*

PLATE  
XXXIV.

Fig. 1, is the representation of a building inclined to the picture, with a part B, projecting beyond the general front A. The shadows of the building are projected upon the ground, and also in part upon the face A; the sun being *before* the spectator or *behind* the picture.

The place of the luminary is marked *Sun*, Fig. 1, near the top of the plate, and its seat upon the horizon is marked S 1.

The

SECT. The point V 1, is the vanishing point of the fronts A and B, and  
 V. V 2 is the vanishing point of the sides G and H of the building.  
 Plate  
 XXXIV. First find the shadow upon the ground of the projection G of the  
 building, as follows:

The point S 1 is the seat of the sun upon the horizon, consequently it is the vanishing point for the indefinite representations of the shadows of all lines that are perpendicular to the ground.

Therefore from that point draw right lines through the lower angles of the building, as from S 1, through the angle a, and also through the angle k; and continue those lines as far as may be thought necessary.

Then determine their lengths as follows:

From the point marked *Sun*, Fig. 1, which represents the luminary, draw right lines through the upper angles of the building, as at the points b, 1, 2, 3, 7; and continue those lines till they intersect the former lines in the points d, 5, 7, 4; which points terminate the length of the shadows upon the ground.

From the points d, 5, and 7, draw lines to the vanishing point V 2, and the outlines of the shadows upon the ground will be determined.

The line c e, upon the front A, is the shadow of the projecting line c b; it may be obtained by drawing a right line from c to e, but it will be more elegantly determined by the following process:

The point V 1 is the vanishing point of all the horizontal lines in the fronts A and B, and A is the front upon which the shadows of the line c b, and also of the projecting rod o 7, are projected.

Therefore draw a right line through V 1 perpendicular to the horizontal line, as the line P V 3; which line is the vanishing line of the fronts A and B, Fig. 1, as marked in the Example.

Then from the point which represents the luminary, marked *Sun*,

Fig 2

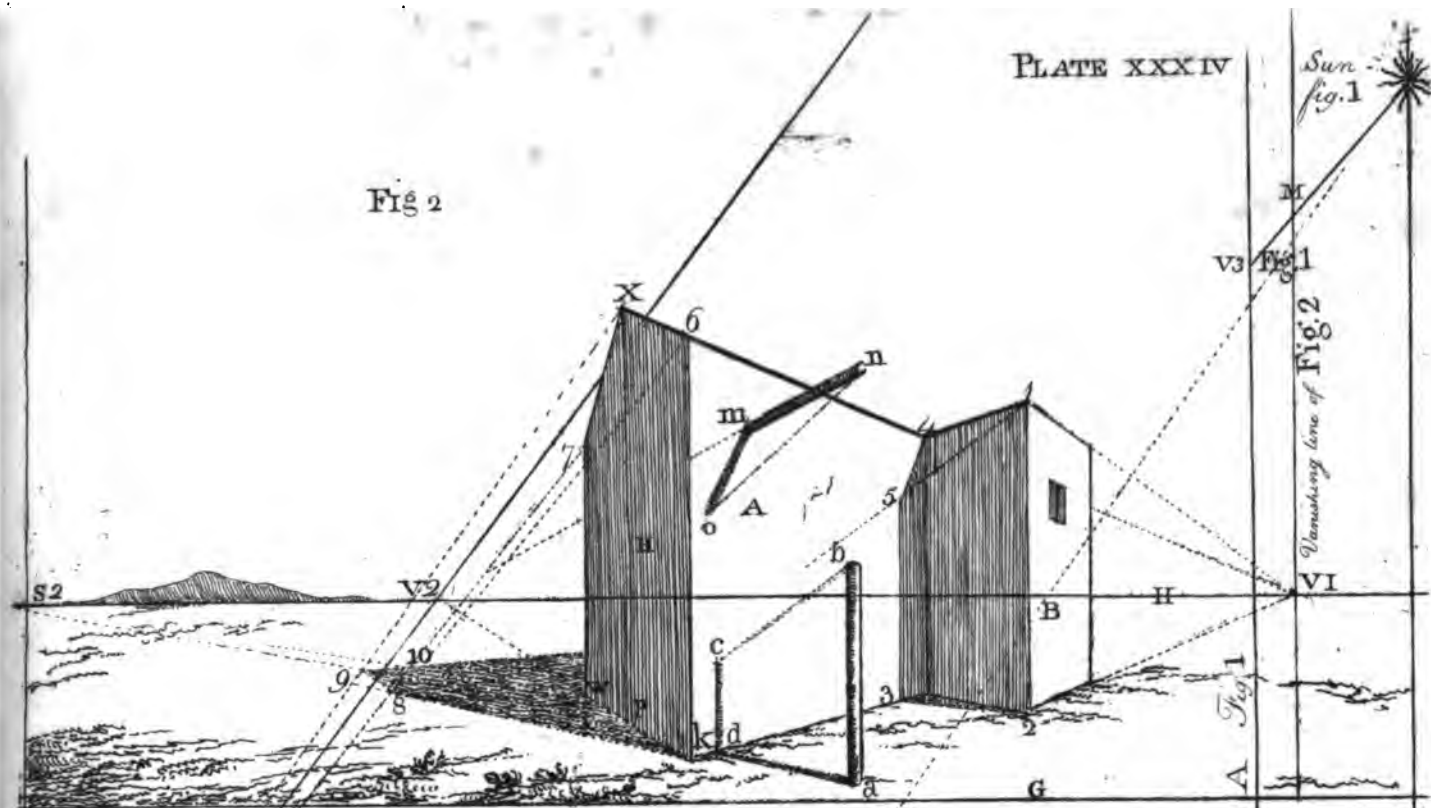


Fig 1

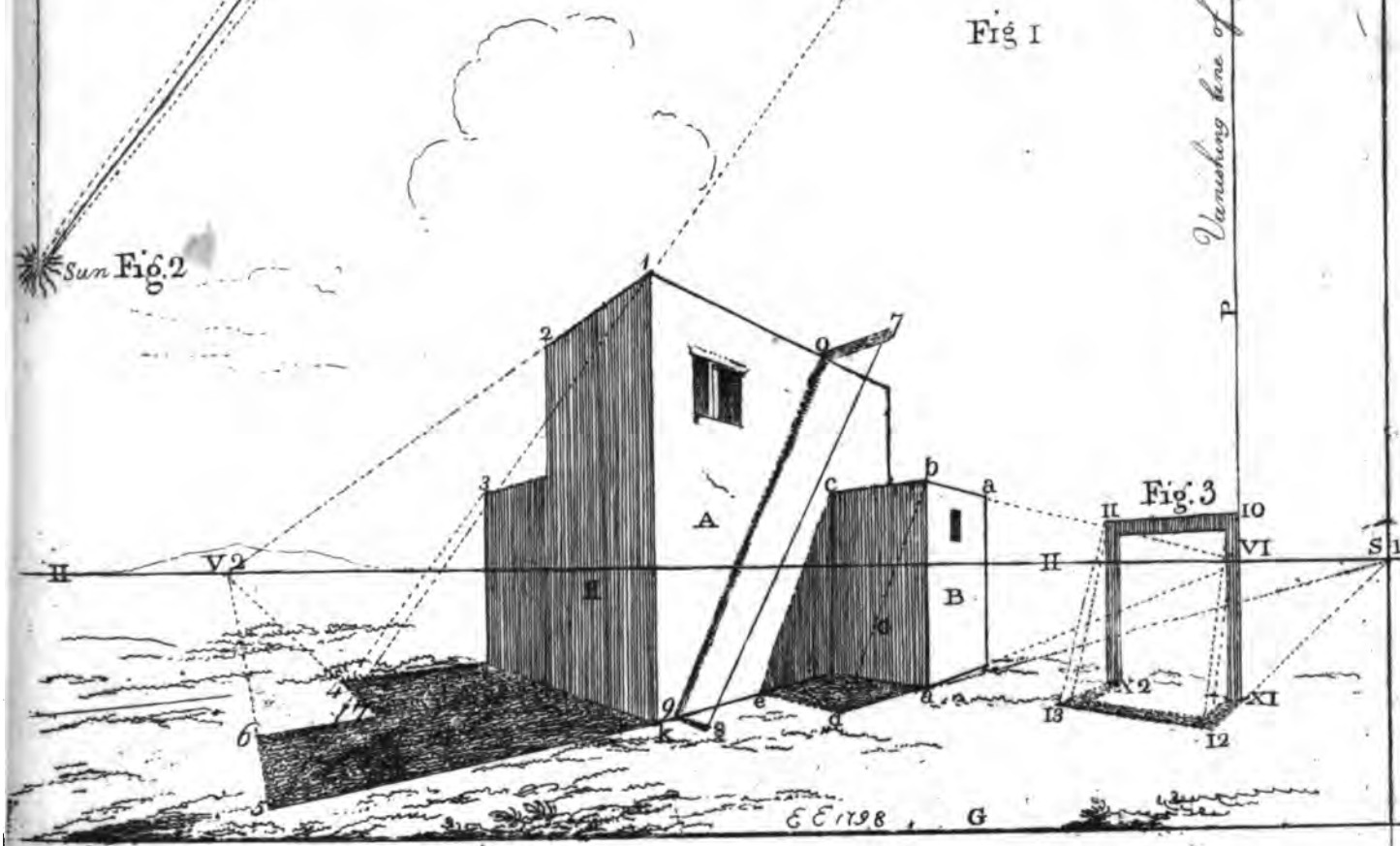
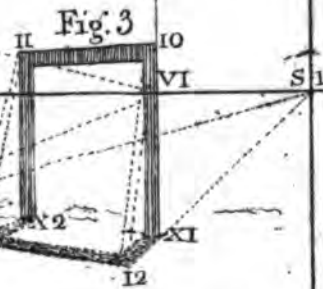


Fig. 3







*Fig. 1*, draw a right line to the vanishing point V 2, which will intersect the vertical vanishing line P, in the point V 3.

SECT.  
V.  
Plate  
XXXIV.

Then is V 3 *Fig. 1*, the vanishing point for the delineation of the shadows of all lines perpendicular to the plane A, as the lines c b and o 7, both of which are perpendicular to the front A.

From the point V 3 draw a right line through the point c, which line will intersect the base line of the building in the point e: consequently the line c e represents the shadow of the line c b.

The shadow of the projecting rod o 7 is chiefly upon the front A of the building, part of it upon the ground.

To obtain this shadow, draw a right line from the vanishing point V 3, *Fig. 1*, through the point o, as the line o 9, and at the point 9 draw a line from the vanishing point V 2, as the line 9 8; then determine the length of the shadow at the point 8, by drawing a right line from the luminous point marked *Sun 1*, *Fig. 1*, through the end 7 of the rod, till it intersects the line 9 8 in the point 8, which terminates the shadow.

After having determined the shadows of the preceding figure, it will scarcely be necessary to give minute instructions for the construction of the shadow of *Fig. 3*: it will be sufficient to observe, that lines drawn from the point S 1 through the lower extremes of the standards, as at X 1 and X 2, will mark their shadows upon the ground; the lengths of which must be determined by drawing lines from the luminous point marked *Sun*, *Fig. 1*, through the points 10, 11; the intersections of which lines at 12, 13, will determine the lengths of the shadows; and lines drawn from the point 12 to the vanishing point V 2, will determine the shadow of the bar 10—11, as represented by the points 12—13 upon the ground.

The building A B, *Fig. 2*, in the same Plate, is similar to the former; but the sun is *before* the picture, or *behind* the spectator.

G g

The

SECT. V. The point marked *Sun*, *Fig. 2*, is the transprojected image of the luminary, and *S 2* is its feat upon the horizon.

Plate XXXIV. The vanishing points for the fronts and sides of the building are *V 1* and *V 2*.

To obtain the shadows which are projected upon the ground, proceed as follows :

Through the middle of the side *H* of the building draw the vertical line *P X* : *X* being the extreme point of the ridge of the roof, and *P*, its feat upon the ground.

From the points *k*, *P*, *W*, draw lines to *S 2* ; which lines may be considered as the indefinite representations of the shadows of the angles and center line of the side *H* of the building.

Then through the points 7, *X*, 6, draw right lines from the point marked *Sun*, *Fig. 2* ; and the interfections of those lines with the former, which were drawn to *S 2*, as at 8, 9, 10, will determine the lengths of those shadow lines. Join the points 8, 9, 10, by right lines, and from the point 10 draw a line to the vanishing point *V 1* ; and the contour of the shadow of the end *H* of the building, as also of its further side, will be determined.

Then proceed to describe the shadow of the projecting part *B*, on the front *A*, as follows :

From the lower angle 2 draw a line to the point *S 2*, which will intersect the base line of the front *A*, in the point 3 ; at which point draw a line parallel to the line 1 2, and from 1 draw a line to the point *Sun*, *Fig. 2*, which will give the interfection 5. Join the points *f* and *e* by a right line, and the outline of the shadow of the projecting part will be determined ; 2 3 being the part which is projected upon the ground, and 3 5 4 that which is projected upon the face of the building.

The shadow of the vertical rod *a b* is partly upon the ground, and partly

partly upon the front A of the building; to obtain which draw lines from a, the base of the rod, to the point S 2, which will give the intersection d. Draw the line d c parallel to the rod a b, and determine its height by drawing a right line from the top b of the rod, to the point marked *Sun*, Fig. 2; and the intersection c will determine the height of the shadow of the vertical rod a b, upon the plane or front A of the building.

SECT.  
V.  
Plate  
XXXIV.

Lastly, find the shadow of the rod m n, which projects from the wall A, as follows:

This rod is perpendicular to the plane A, and parallel to the end H, and also to the horizon; therefore V 2 is its vanishing point. And the shadow is cast or projected upon the plane A; which plane is inclined to the picture.

Now the vanishing point for all horizontal lines in the plane A is V 1; therefore, through that point draw a right line perpendicular to the horizontal line H, as the line V 1, M; which line is marked *vanishing line of the face A, Fig. 2.*

Continue that line upwards as far as may be thought necessary; and then from the point marked *Sun*, Fig. 2, draw a right line through the vanishing point V 2, till it intersect the vanishing line V 1, M; and that point of intersection will be the vanishing point for the indefinite shadows of all lines that are perpendicular to the fronts A and B; or, in other terms, to planes which vanish in the line V 1, M.

From the vanishing point produced by the foregoing process (which point is not in the Example, for want of space in the Plate,) draw the right line m o through the point m, which is the base of the rod m n, or its intersection with the plane A. Then from the point marked *Sun*, Fig. 2, draw a line to the point n of the rod; and

G g 2

the

SECT. V. the interfection with the former line, as at o, will determine the length of the shadow; consequently m o is the shadow of m n.  
 Plate XXXV.

*Of Shadows upon Planes inclined to the Horizon.*

Plate XXXV. Fig. 1 and 2,

Are Examples for the delineation of shadows upon inclined planes, as also upon the ground or horizontal plane.

Fig. 1, the first Example, is when the sun is *before* the picture, or *behind* the spectator.

Fig. 2, the second, when the sun is *behind* the picture, or *before* the spectator.

H is the horizontal line, and G the ground line, in both Examples.

A a, Fig. 1, is an upright or vertical rod, and it is required to describe its shadow upon the block B, whose face is inclined to the horizon.

The transprojected place of the sun is marked *Sun, No. 1*: therefore from that point draw a line perpendicular to the horizontal line H, which will produce the interfection S, No. 1; which must be considered as the feat of the luminary upon the horizontal line, and consequently is the vanishing point for the shadows, upon the ground, of all lines that are vertical or perpendicular to the horizon. Thus the shadows of all the vertical lines in the rod A a, which are cast or projected upon the ground, vanish in S, No. 1. But before any part of the shadow is described upon the ground, it will be proper to find the vanishing point for that part of the shadow, which is projected upon the inclined face of the block B, and which is found as follows:

The

Fig 1.

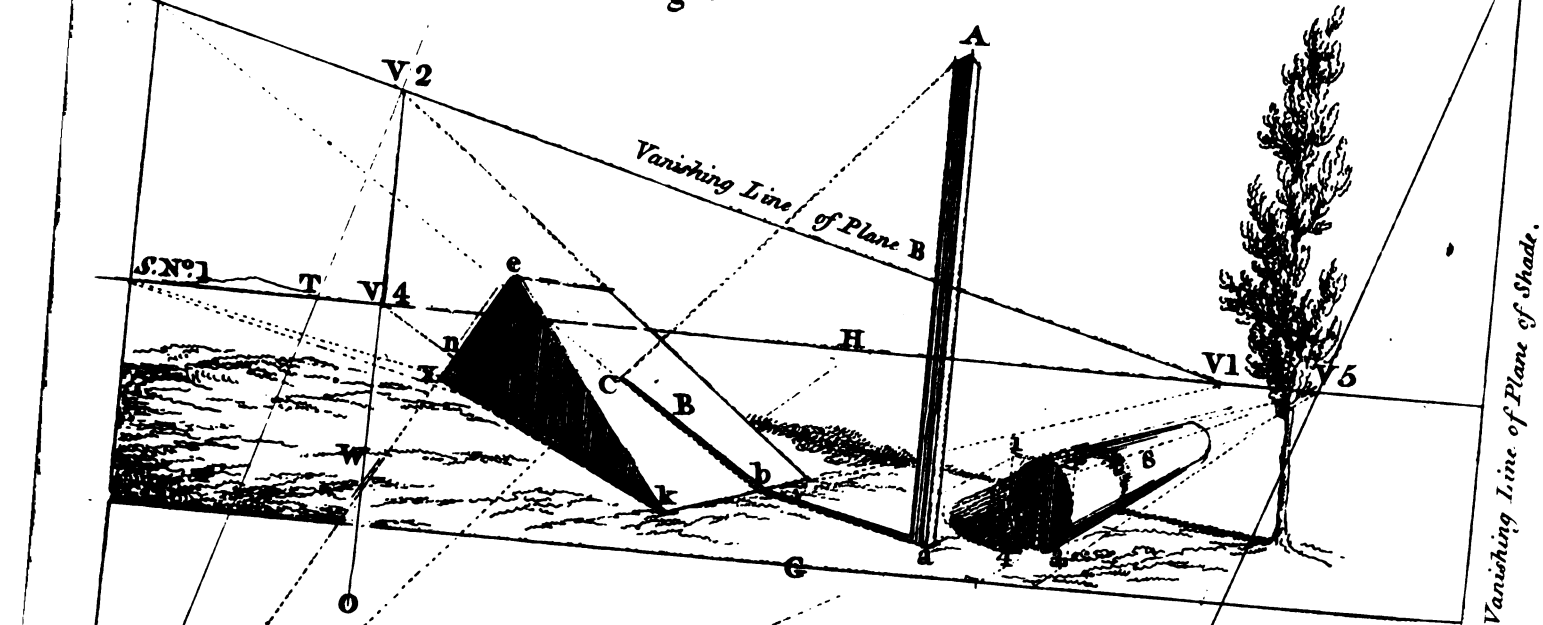
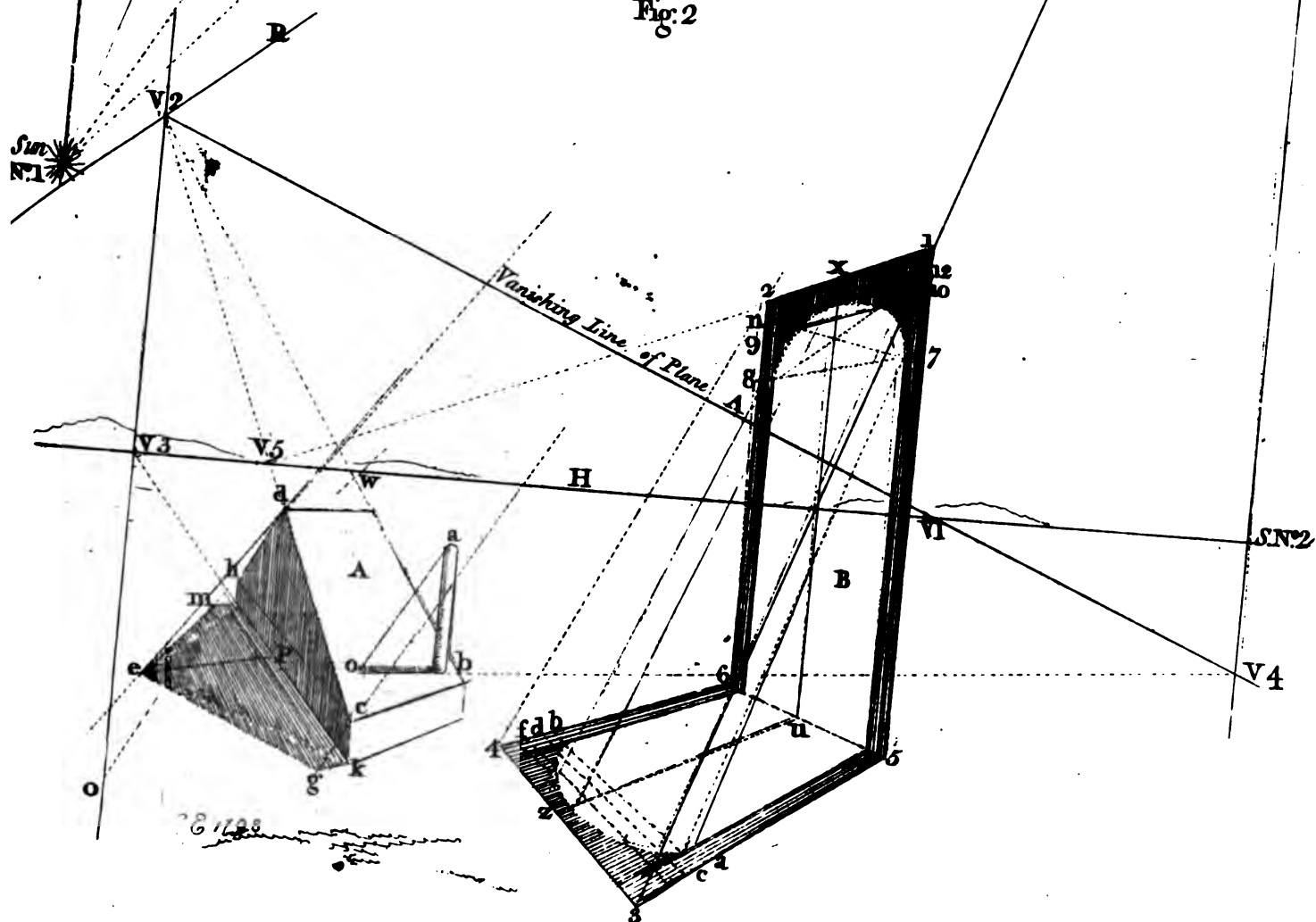


Fig 2.





The line V 1, V 2, is the vanishing line of the inclined plane B; therefore produce or continue it from V 2 towards V 3, as far as may be thought necessary.

SECT.  
V.  
Plate  
XXXV.

Then continue the line that is drawn from Sun, No. 1, till it cuts the vanishing line V 1, V 2, in the point V 3: then is V 3 the vanishing point for the shadow of the rod A a, when cast or projected upon the inclined face B, as also for all shadows that might be projected upon such inclined plane by any vertical line whatever.

Having thus found the vanishing points, determine the shadow as follows:

From the bottom of the rod a, draw lines to the point S, No. 1, which will represent the portion of shadow, a b, upon the ground, intersecting the base of the block at b: from the point b continue the shadow upon the inclined face, by drawing lines to the vanishing point V 3.

Then from the top of the rod A, draw a right line to the point *Sun*, No. 1, which will give the intersection C, and determine the apparent length of the shadow; the part from a to b representing the portion which falls upon the ground or horizontal plane, and the space from b to C the portion which is projected upon the face of the block or inclined plane B.

The shadow of the block B, upon the ground, is obtained as follows:

Draw the line d e, from the middle of the base to the apex or intersection of the two inclined planes, which constitute the form of the block.

From the point d draw a right line to the vanishing point S, No. 1, and from e to *Sun*, No. 1, producing the intersection x; which is the shadow upon the ground of the point e of the block.

From

SECT. V. From the points k and n in the base of the block, draw lines to the point x, and the contour of the shadow of the block upon the ground will be determined.

Plate  
XXXV.

The shadow of the cylinder S, upon the ground, is determined as follows :

Circumscribe the base D by the perspective representation of a square, and draw the diagonals and diameters 1, 2, 3, 4, &c.; then find the shadows of those points upon the ground, and those points of shade must be the guides to direct the artist in describing the contour of the ellipsis, that will express the required shadow. But this will be better explained in the Example B, Fig. 2, in the same Plate.

The shadow of the tree is obtained by drawing lines from the root or lower part, to the point S, No. 1, the seat of the sun upon the horizontal line, and then determining the length by a line drawn from its summit to the transprojected representation of the luminary marked Sun, No. 1.

In Fig. 2, of the same plate, is the representation of an inclined plane A, which may be considered as the roof of a house, the shadow of which is projected upon the ground, together with a vertical rod a.b, the shadow of which is projected upon the roof or inclined plane A. H is the horizontal line, and G the base or ground line.

In this Example the sun is supposed behind the picture, or before the spectator, and its image is marked *Sun*, No. 2, in the upper part of the Plate, and its seat on the horizontal line is S, No. 2.

The line V 1, V 2, is the vanishing line of the inclined face A, and V 1 and V 3 are the vanishing points of the base of the block A, Fig. 2.

For the shadow of the block upon the ground, the process is the same with that of the preceding Example. It is obtained by drawing

a line



a line from the seat of the luminary S, No. 2, through the point P, and another from the point *Sun*, No. 2, through the point d, which will intersect the line that is drawn from P in the point e. Then transfer the points c, and h, to g and m, by lines drawn from the *Sun*, No. 2, and join the points e, g, and e and m.

SECT.  
V.  
Plate  
XXXV.

It is almost unnecessary to observe, that the line k g; which is the shadow of k c, is obtained by drawing a line from S, No. 2, through the angle k of the base, and marking the length k g by a line drawn from the point marked *Sun*, No. 2.

Then find the shadow of the vertical rod or stick a b, as follows:

Continue or produce the line which is drawn from *Sun*, No. 2, to S, No. 2, till it cuts or intersects the vanishing line of the face A of the block, as at V 4; which will be the vanishing point for the shadow of all vertical lines that may be projected upon the inclined plane A.

Therefore from the vanishing point V 4 draw a right line through the bottom of the rod b, as the line b o; then draw another right line from the *Sun*, No. 2, through a, the top of the rod, till it cuts the former line at the point o, which determines the length of the shadow; therefore b o is the shadow of a b.

It must be observed, that the shadow of every right line, which is inclined to the plane of projection, must in all cases be determined by the foregoing process, which is founded on the following theory.

The vanishing point of the shadow of every right line is always in the vanishing line of the plane upon which that shadow is cast or projected.

Thus the shadows, upon the *ground*, of all the lines which compose the objects in Plate XXXV. have their vanishing points in the horizontal line, and those shadows which are cast upon the *inclined* planes.

SECT. planes have their vanishing points in the *vanishing lines* of those  
 V. inclined planes.

Plate  
 XXXV.

Thus in Fig. 1, Plate XXXV. that part of the shadow of the rod a A, which is projected on the ground, has its vanishing point in the horizontal line at S, No. 1; while that part of the shadow which is cast on the block B, vanishes in the point v 3, which is the *vanishing line* of the plane B, which line is indicated by its title.

The shadows upon the ground of the inclined lines k e n, which form the upper angles of the side of the block B, Fig. 1, Plate XXXV. and also the shadows of the similar parts of the block A, Fig. 2, in the same Plate, may all be obtained by the following process, which is the most elegant that can be employed.

#### Example 1st.

When the *sun* is before the picture, or behind the spectator, Fig. 1, Plate XXXV.

The point V 2 is the vanishing point of the inclined line e k, whose shadow is required upon the ground.

Through the point V 2 draw a right line to the point which expresses the luminary marked *Sun*, No. 1, which will intersect the horizontal line in the point T, the vanishing point for the *shadow* of the line e k, as also for all lines parallel to it.

From the point k draw a line to the vanishing point T, which will be the indefinite representation of the shadow required.

The shadow of the line e n is determined as follows:

The line V 2, V 4, is the vanishing line of the side d e of the block.

Continue the line V 2, V 4, downwards below the horizon, as far as may be thought necessary, as to o; then continue the line e n till it cuts the vanishing line V 2, o, in the point W, which is the vanishing point of the line e n.

From

From the point marked *Sun*, No. 1, draw a right line through the point *w*, and continue it till it intersects the horizontal line; which intersection will be the vanishing point for the shadow upon the ground, of the line *e n*.

SECT.  
V.  
Plate  
XXXV.

No 3 in the same Plate represents an elliptical arch, the shadow of which is projected upon the ground, but as it is presumed that the perspective representation of the arch, is already drawn by the rules given in the foregoing Treatise, no other instructions are here given than such as relate to the shadow.

The luminary and its feat, are the same with the former Example.

Through the points 5 and 6, which are the outer extremes of the base of the plane through which the arch is perforated, draw right lines from the point *S*, No. 2, which is the feat of the luminary; then from the point *Sun*, No. 2, draw lines through the upper angles of the plane containing the arch, as the points 1, 2, as also its center *x*; and continue those lines till they intersect the former in the points 3, 4, and *z*; and draw the line *s 4* tending to the vanishing point *V* 5, that being the vanishing point of the plane in which the arch is disposed.

Having thus found the shadow of the plane which contains the arch, proceed to describe the shadow of the arch as follows:

The lines or ordinates 7, 8, 9, 10, 11, 12, together with the diagonals, being necessarily drawn for the purpose of obtaining the perspective representation of the arch, transfer those points by lines drawn through them from the *Sun*, No. 2, till they intersect the outline of the shadow which is upon the ground, as at the points *a b*, *c d*, *e f*; and also draw the diagonals, which will produce a reticulation, the intersecting points of which must be the guide for the construction of the outline of the ellipsis that represent the shadow of the arch.

H h

As

SECT. V. As it is not possible to give more minute instructions for the delineation of the shadow, without rendering them obscured by their intricacy, it will be sufficient for the artist to consider the Example with attention, and he will easily perceive that the process consists in finding the shadows of a certain number of points in the arch of which the shadow is required; and by the assistance of those shadowy points describing the ellipsis representing the shadow required.

Plate  
XXXV.

Thus the point s, upon the ground, is the shadow of the angle 1, and a is the shadow of the point 7, as c is of the point 10, and fo. on of the rest.

From these points lines are drawn to the vanishing point V s, through which lines, diagonals are drawn, which produce points of intersection that must direct the form of the shadow required.

It must be noticed, that the shadows of all curved lines are obtained by the same process which is employed to determine the perspective appearance of circles and curves, as given in Plate XXIII. Therefore if the shadows of curved lines are to be described accurately, the shadow of the *reticulation* which determines the perspective appearance of such curves; must serve as the guide for the delineation of such shadow. Although it must be confessed that the process is attended with such infinite trouble, as renders it almost improper for the attention of the artist; it will therefore be enough for him to employ some general rules, which, with a good eye, will determine with sufficient accuracy all that will be necessary for his purpose.

#### *Of Shadows projected by the Torch or Candle.*

Before any instructions are given upon this subject, it will be necessary to make some observations upon the constructions of such shadows; there being great difference in the manner of delineating those

those which are projected by the candle or torch, and those projected by the sun.

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V.  
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XXXV.

Their specific or natural distinctions have been already noted in the commencement of this Section; which distinctions occasion a very material variation in the process.

In the representations of candle-light subjects, the luminary should always be represented, or its place indicated in the picture; for if it should be supposed behind the spectator, the piece will not with certainty express whether it be intended for torch-light or day-light, otherwise than by the diverging direction of the shadows. See Note, Page 213.

The student must observe that in all the foregoing Examples, wherein the sun is the luminary, the seat of that luminary is the intersection of the *plane* of its rays with the *vanishing line* of the plane of projection: but in the case of the torch or lamp the seat of the luminary is always *in the plane* of projection: therefore the seat of the candle or torch must be found perspectively before any representation of shadow can be attempted; it will therefore be proper to give some directions how the seat of the luminary should be determined.

The seat of the luminary, upon the plane of projection, is the point in which a right line supposed to pass from the luminous point *perpendicular* to that plane cuts it, which point is the seat required.

Thus in Fig 3, Plate XXXII. the point W is the wick of the candle, and the point S is its seat upon the floor. The line W S, being perpendicular to the floor or plane of projection.

Plate  
XXXII.

Again, the point V 1 is the seat of the wick upon the right hand wall of the room; the right line which is drawn from the wick W perpendicular to that wall, producing the intersection V 1.

It must be remembered, that the regular course of operation re-

H h 2

quires

S E C T. V.   
 Plate   
 XXXII. quires that the feat of the luminary be first found, either upon the walls or upon the floor of the interior of the building, and then the representation of the wick is determined by the feat.

The feat and luminous point of the candle must be determined by measure, as follows :

In the first place, the distance of the luminary from one of the side walls must be known or supposed, as from V 1 to W.

Secondly, its distance beyond the picture, as from A to S.

Thirdly, its height above the floor, as from S to W.

The measures of these distances being known, or supposed, set off upon the base line from the representation of the intersection of the wall with the picture, the measure equal the distance of the candle from the wall, as to A.

Then from A set on upon the same line to B, a measure equal the distance of the candle *beyond* the picture.

From A draw a right line to the center of the picture C, and from the point B draw a right line to the distance of the picture D; and the intersection S will be the *feat* of the luminary upon the floor.

At A and S draw right lines perpendicular to the floor, as A F and S W.

Upon the line A F set up the measure equal the known height of the wick of the candle above the floor, as at K; and from K draw a right line to the center of the picture C, which will intersect the right line S W in the point W; consequently that intersection is the luminous point required.

The feat of the wick W, upon the wall, is at V 1, which is determined as follows :

From the point S, which is the feat of the luminary upon the ground, draw the line S T parallel to the horizontal line; which line intersects the lower angle of the room in the point T.

At

At the point T draw the line T O perpendicular to the horizontal line, and from the wick or point W, draw a line parallel to the horizontal line, and its intersection with the line T O determines the seat of the luminary upon the side wall, as at V R.

SECT.  
V.  
Plate  
XXXII.

It is unnecessary to continue instructions for determining the point V 2, which is the seat of the luminary upon the ceiling, as a repetition of the foregoing process is all that is required.

Fig. 3. Plate XXXII. is the representation of a room containing various objects, the shadows of which are produced by the light of a candle; some being projected upon the floor, and others upon the sides of the room.

H H is the horizontal line.

C, the center of the picture.

W is the luminary, or wick of the candle.

S, the seat of the luminary upon the floor.

To obtain the shadow of the table or block A, upon the floor, proceed as follows:

From S, which is the seat of the candle or luminary upon the floor, draw right lines through the lower angles of the block f, g, h; continuing them as far as may be thought necessary.

Then from the wick or luminous point W draw right lines through the points 1, 2, 3, which are the upper angles of the block; and their intersections with the lines that are drawn from the seat S, through the lower angles, will give the points 4, 5, 6; marking the extremes of the shadow required.

Join the points 4, 5, by a right line; and from 4 and 5 draw lines to the center of the picture C, and at the point 6 draw a line parallel to the horizon, and the outlines of the shadow of the block upon the floor will be determined; which requires only to be filled up with shade to complete the representation.

The

SECT. V. The shadows of the rods P, q, s, upon the wall T, are produced as follows:  
 Plate XXXII. V 1 is the seat of the luminary upon the wall O.

Therefore from V 1 draw right lines through the points P, q, s, which are the seats or insertions of the different rods upon the wall; then from the luminary W draw lines through the extremes of those rods, as at o, t, 7, which will intersect the preceding lines in the points 9, x s; then will 9 p, be the shadow of the rod 7 p, while s x is the shadow of T s, as q s is the shadow of o q.

For the shadow upon the ceiling of the suspended rod y k :

V 2 is the seat of the luminary upon the ceiling; therefore through k (which is the seat or end of the rod y k, that is inserted into the ceiling) draw a right line from V 2 and continue it; then from the luminary W, draw a right line through y that may intersect the line V 2, k, in the point z; then is k, z, the shadow of k y, upon the ceiling.

Then find the shadow of the vertical rod a b, upon the inclined face of the block K, for which purpose draw a right line from S, the seat of the luminary upon the floor, through a, till it intersects the base line of the block at n, continue the line till it cuts the base line of the back part of the block, as at u; then at u draw the perpendicular line u v, and from n draw a right line to v; then will n v be the indefinite shadow of the rod a, b, upon the plane K; therefore determine its apparent length by drawing a right line from the wick of the candle W, through the top of the rod b, till it intersects the line n v, as at c, then is a n the length of the shadow of a b, upon the ground; and n c the continuation of the same shadow upon the inclined plane K.

The shadow of the block K upon the ground, and upon the wall H, must be determined by the following process:

The line B is the intersection of the side of the room with the floor.

Therefore



Therefore through the point *a* at the bottom of the block, draw a line from *S*, the feat of the luminary, that may intersect the line *B*, as in the point *d*; at the point *d* draw the line *d f* perpendicular to the floor or horizon; then through the point *e*, which is the upper angle of the prism, draw a right line from the luminary or wick of the candle *W* that may intersect the line *d f*, as in *f*.

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XXXII.

Then from the point *f* draw a line to the center of the picture *C*, which line will be the upper boundary of the shadow upon the wall.

It must be observed, that to determine the true representation of the shadow of the inclined line *b e*, requires more space than is contained in the Example; therefore the process is demonstrated in Fig. 4 of the same plate, as follows:

Let *C* be the center of the picture, and let the line *B* be considered as the lower edge of the side of a room intersecting the floor.

The luminary or wick of the candle is marked *L*, and *S* is its feat upon the floor.

It is required to represent the shadow of the block *A* upon the floor *F*, and on the wall *G*.

The line *a d* is the perpendicular angle of the block, and is the line by which the shadow is chiefly determined; therefore from *S*, the feat of the luminary, draw a right line through the point *d*, and continue it as far as may be thought necessary.

Then from the point *L*, which is the luminous point, draw the right line *L h*, which will intersect the line that is drawn through *d* in the point *h*.

Join the points *b* and *h* by a right line, and the triangle *b d h*, will be the shadow upon the ground of the triangle *H*, which forms the nearest end of the block or prism.

If the shadow of the block was required upon no other plane than the ground, a line drawn from the point *h* to the center of the picture.

S E C T. V.   
 Plate XXXII. ture C, would determine such shadow. But in the Example a part of the shadow is also cast upon the wall or side G of the room; which must be defined by the following process :

The line d h, cuts the line B, which is the interfection of the wall with the floor in the point x; therefore at x draw the line x f perpendicular to the floor.

Then from the luminary L draw a right line through a, and its interfection of the line x f, will determine the height of the shadow; therefore the line d x represents the shadow of the line or angle d a of the block upon the floor, and the line x f the continuation of shadow upon the wall.

Then as the line b g, represents the shadow of the inclined line b a upon the floor, its interfection g, with the line B, terminates that shadow upon the ground; therefore join the points g f by a right line, which will complete the shadow of the inclined line a b, both upon the floor and likewise upon the wall. And further to complete the shadow of the block or prism, draw a right line from f to the center of the picture C, and the whole of the shadow will be defined, as demonstrated by the Example.

*General Rules and Observations concerning Shadows.*

In the representations of shadows the artist should be careful not to make them too hard or abrupt at their terminations; because every shadow terminates by what is called a penumbra, which is the faint and indistinct transition from the obscure to the illuminated part of the plane upon which such shadow is projected. Nor should the shadow be too dark, for it must be remembered that shadows projected by the sun are softened by the surrounding rays, and by the general diffusion of light through the atmosphere. It is from this circumstance that shadows produced by the light of a torch or candle,

dle, are darker than those projected by the sun ; although the light is less forcible by the former than the latter agent ; hence it follows that shadows in candle-light pictures must, in the language of painters, be represented heavier or less transparent than in those of day-light. S E C T.  
V.

It must be observed that decided shadows, as produced by the sun's rays, must never be introduced into works of the higher classes of art ; on the contrary, they should be described as produced by a diffusion of light introduced from some particular part, or through some aperture. This has been the practice of all the great masters, and therefore needs no other recommendation than a reference to their examples.

In landscapes of the composite kind, it is not necessary to give decided shadows except in the buildings, which should at least not be false ; but all the other objects are so complex that they almost defy the rules of the science : and therefore the artist should atone for that deficiency by a particular attention to the chiaroscuro of his picture.

In all cases where the positive shadows of the objects are required, either in the drawing or picture, the outlines of those objects should be completely finished before the shadows are attempted ; otherwise the confusion of lines will render the work unnecessarily laborious and intricate.

In views of streets or representations of particular buildings, the shadows should be accurately, yet tenderly, determined ; and as true to nature as possible ; for which reason the artist should chuse that time of day in which the sun is so situated as to produce the greatest beauty of effect, with the best demonstration of the parts.

SECT. V. The same rules apply equally to the local view or landscape, the shadows of which should always be determined from nature, for which reason it will ever be proper to define the outlines of the shadows from their natural appearance.

These instructions cannot be better concluded than by observing, that many views have been drawn, yet so false in the shadows, that much of their similitude has been lost; a defect which followed in consequence of the inattention of the artists who drew them; for having drawn the outlines upon the spot, they afterwards added the shadows by their memory and imagination; a practice which can never be justified by the productions of those by whom it has been adopted.

END OF THE FIFTH SECTION.

## SECTION THE SIXTH.

*Containing Examples, with Instructions for facilitating Operations, in some Cases of Difficulty ; together with Observations, as a Praxis for illustrating the Principles of the Science.*

IN some of the plates which belong to this work there are examples, or figures, which are not explained in the Sections to which those plates belong ; because it was apprehended that such explanations would produce confusion in the mind of the student, by diverting him from the regular and progressive order of instruction.

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It was therefore thought proper to subjoin a few pages, in which some useful instructions and observations might be given, that should explain those figures ; some of which illustrate particular cases in practice, as others exemplify principles of the theory, which ought to be understood by those who study Perspective.

In most of the treatises that have been written on the science of Perspective, the authors have illustrated their instructions by Examples, in which the geometrical plans are drawn below the base line or intersection of the picture, as a necessary preparation to the construction of the perspective representations which are to be delineated.

This method is not confined to the inferior, but is also practised by the superior writers upon the subject ; yet it may be questioned,

I i 2

whether

SECT. VI. whether this circumstance has not obstructed rather than promoted the study of the science.

It has already been observed in the introductory Section \*, that the painter can never have room or space below the base line of his picture to draw geometrical plans; consequently, all the diagrams which are so constructed, must appear to the uninstructed student as totally inapplicable in practice, and therefore unfit for his purpose; seeing no space in the canvas can correspond with that part of the Example which represents the original plane.

To shew the process by which such diagrams are constructed, a few Examples are given in the Plates, and explained in this Section, which will assist in illustrating the principles of the science; and also demonstrate how easily the practical rules can be employed by the artist in all cases, without the trouble of drawing the geometrical plan of the object he wishes to represent.

*Example of a Square.*

Plate  
VIII.

Plate VIII. Fig. 3. No. 1. No. 2.

These figures, No. 1 and No. 2, must be considered as one Example for drawing a square in Perspective, according to the methods employed by most of the former writers upon the subject.

In this Example it is supposed that a square is to be drawn upon the same floor or plane on which the stool, Fig. 1, is standing; and that one of its sides is parallel to the picture. The same center and distance is employed both for the stool and the square.

H, is the horizontal line. G, the ground line or intersection of the picture. C, the center of the picture. And D, its distance.

The dimensions of the square are as follows :

The sides are 10 inches.

The border 1 inch and a half broad ; therefore the inner square is 7 inches on each side ; and it is 4 inches beyond the picture.

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VIII.

*Process.*

Below the base line G draw the square at the proportionate size by the scale, as at Fig. 3, No. 1, and equally distant below the base line, as the original object is beyond the picture.

Then continue the sides of the square till they cut or intersect the ground line G, as at S, f, V, o ; then on the point o, with the compasses extended to the point a, describe the arc a, g ; and from o to e describe the arc e, P ; which will give the distances which the angles a and e of the square are beyond the picture. Draw lines from the points S, f, V, o, to the center of the picture C ; and from the points g and P draw lines to the distance D, and the intersections at Z, Z, will give the exterior dimensions of the square perspective.

In this operation it is evident, that all the labour which is employed upon the geometrical square, Fig. 3, No. 1, which in the Example lies below the base line or intersection of the picture, is useless to the painter, as it cannot be employed upon the canvas. If it be said that such process might be performed on a separate paper, and then transferred to the canvas, we may observe, that such an operation would only increase instead of diminish the labour ; every particle of which would be saved by the following process :

Determine the seat of the angle a of the square upon the picture, as at o, then by the scale set off, upon the base line G, 10 inches, the measure of the side of the square, which is parallel to the picture ; as from o to S ; and within that measure set the breadths of the border, as S, f, and V, o ; from which points draw lines to the center of the picture

SECT. VI. picture C, then from o set off 4 inches to g, the known distance of the square beyond the picture, and from g to q 10 inches by the scale, the measure of the side of the square which is perpendicular to the picture; and from the points g and q draw lines to the point of distance D, and the intersections of those lines at Z, Z, will give the apparent depth of the square. At the points Z, Z, draw lines parallel to the base line, and the outline of the square will be completed.

Plate XII.

In Plate XII. Fig. 1, which belongs to the third Section: the Example there given, together with the instructions Page 103, demonstrate the *readiest* and *best method* of finding the vanishing points of objects whose sides, or faces, are *inclined* to the picture.

But there is another method which is generally used and taught by the authors \* who have written upon the science, for which reason it shall also be given here.

The method is as follows :

Below the base line A, a, b of the picture, draw the geometrical plan B 1, D 1, B 2, D 2; with the side B 1, making the same angle, with the base line A a, which the original object is known or supposed to make with the picture.

Thus if the longest side of the object inclines to the picture in an angle of 35 degrees, let the line B 1, in the plan, be drawn, making an angle of 35 degrees, with the base line a, A, b.

Having completed the geometrical plan, continue, or produce, the sides B 2, D 2, till they cut or intersect the base line as at a and b, which are the intersections of the sides B 2, D 2.

Then having determined the center of the picture C, and the distance or eye E; through E draw the right line B 4, *parallel* to B 2, a,

\* See Malton, senior, Plate 12, Fig's 59 and 60. Also Highmore, Plate 4, Fig's 19 and 20. Kirby, Book II. Plate 2, 3, and 4; with many others.

in



in the plan, and also the right line D 4 parallel to D 2, b; and the intersections of those lines with the horizontal line as at V 1 and V 2 will be the vanishing points required.

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XII.

Having thus found the vanishing points V 1 and V 2, find the perspective plan as follows:

From the angle c, which touches the base lines, draw right lines to the vanishing points V 1 and V 2; then from the intersection a, draw a right line to V 2, and from b draw a line to V 1, and the intersection of those lines will produce the perspective appearance of the plan\*, the remote angle of which would be seen at S, if the objects were transparent.

In this process the distances of the vanishing points are not employed to cut off portions of the representative lines. For the intersection of the original lines, with the picture a, b, c, being found, it follows, that the indefinite representations of those originals, which are the lines drawn from the points a, b, c, to the vanishing points, do, by their mutual intersections with each other, produce the representation required.

When the object to be represented is situated beyond the picture, the process differs not in effect from the foregoing; but as there is a material variation in the appearance, it cannot be improper to add a third Example of a square *placed beyond* the picture, with its sides inclined to it, as in Fig 2, Plate XXXVII. which is produced by the following process:

Plate  
XXXVII.

H H is the horizontal line:

C, the center or picture:

E, the eye or distance:

G c, is the base line or intersection of the picture.

P P, the parallel of the picture.

\* This is perfectly consonant to Dr. Brook Taylor's Theory; who observes, that the "Representation of a line is part of a line, passing through the intersection and vanishing point of the original line." See the Doctor's Treatise, Prop. 1, of first Edition; and Theorem 3d of the second Edition.

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XXXVII.

At the proportionate distance below the base line G draw the geometrical square A to the proper size by the scale, with the sides inclined to the base line G, d; making the same angles with it as the sides of the original object are known to make with the picture.

Continue the sides e, f, g, h, of the geometrical square A, till they intersect or cut the base line, as at the points a, b, c, d.

Through the eye E, draw the right line R 1, parallel to the line g, d, and R 2 parallel to a, h; which lines will cut the horizontal line in the points V 1 and V 2; consequently V 1 is the vanishing point for the sides h and f, and V 2 is the vanishing point for the sides e and g of the square.

Therefore from the points a, b, in the base line, draw lines to the vanishing point V 2, and from the points c, d, draw lines to the vanishing point V 1, and the perspective representation of the square will be completed by the intersections of those lines, as at 1, 2, 3, 4.

It must also be observed, that the perspective representation of the square, may be obtained by one vanishing point only, as follows:

Let V 1 be the only vanishing point to which lines are drawn from d and c, which lines are the indefinite representation of the two sides e g, of the square.

From every angle of the geometrical square A, draw lines to the eye E, and their intersections with the lines d v 1, c v 1, will determine the angles of the perspective representation of the square, as the line from x to E gives the point 1; and the other points 2, 3, 4. may be obtained by the same process, which will easily be understood by applying a ruler to every angle of the geometrical square A from the point E.

By examining this diagram, as also that in Plate XII. Fig. 1, where the plan is marked, it will be easily seen that this process cannot be employed with advantage by the artist; seeing that it is

attended with additional trouble compared with the simple process by the measures, as given in Plate XI. and that great space is required at the bottom of the tablet. Yet it will be particularly useful to illustrate the leading principles of the science; therefore let the Fig. 2, Plate XXXVII. be considered as a diagram representing three different planes, as follows:

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XXXVII.

G d, is the ground line or intersection of the picture; and all the part of the figure which lies below that line, must be considered as the ground upon which the square A is placed, and which is to be represented upon the picture.

H H is the horizontal line, and all the space which lies between that line and the ground line G d, is the part of the picture, which includes all that can be seen between the commencement of the view, and the horizon:

The space between the lines H H and P P, represents the horizontal plane, passing through the eye of the spectator; upon which plane the operation is performed, by which the vanishing points are found.

This will be better understood if the diagram be folded in the following manner:

Let the space that lies below the ground line G d, be folded *back* at the line G d, and laid flat upon a table; then let the space which lies between the lines H H and P P be folded through the line H H and brought forward, while the space between the lines G d and H H is placed vertically or upright upon the table; then will that part which lies upon the table express the ground with the object beyond the picture, the space between the lines H H and G d, the part of the picture upon which the object is represented, and the part between the lines H H and P P, the parallel plane to the horizon; all of which by such disposition will be properly placed: in which situation if lines or threads, were passed from the angles of the square

K k

A to

SECT. VI.  
Plate XXXVII. A to the eye E, those lines or threads would pierce or pass through the points 1, 2, 3, 4, in the vertical plane which represents so much of the picture as stands between the base line G d and the horizontal line H H. The former being the line where the ground is first seen, and the latter the boundary at which it appears to terminate\*.

The student must observe, that the planes when disposed as above directed, must be considered as in their natural positions; but as in those positions the necessary operations cannot be performed, they are all laid flat or brought into one plane only; by which means the points, lines, and interfections, are determined with ease and accuracy.

#### *Of the Station Point.*

As no perfect representation in Perspective can be obtained unless the situation of the original object be known, and its apparent position justly determined upon the picture, it will be necessary to consider this circumstance with some attention.

Some observations have already been made concerning the station in page 29, to those it will be necessary to add the following:

The station is always in a line perpendicular to the picture, which line is in the same vertical plane, and also parallel to the *radial* which produces the center of the picture.

Thus in Fig. 2, Plate II, the eyes of the spectators D 2, D 3, are in the horizontal line H H; and the center of the picture to those spectators is C 2; their stations are the points upon which they

\* The Example of the square given in Fig. 3, Plate XII. may in the same manner be folded at the base line A a, and the plan laid back: the part between that line and the horizontal line H H placed erect or vertically; while the part between the horizontal line and the parallel of the picture must be brought forward, all the planes and lines will then be in the proper situation.

stand,

stand, and are in a line that intersects the picture at e; which line is *perpendicular* to the picture and *parallel* to the line D 2, C 2; which is the radial producing the center of the picture.

SECT.  
VI.  
Plate  
II.

Therefore C 2 is the center of the picture to the figures D 2, D 3, and C 1 is the center of the picture to the figures D 1, and e is the representation upon the picture of the *stations* of all those figures.

The method in practice of finding the station on the picture, is by drawing a right line through the center of the picture, perpendicular to the horizontal line, till it cuts or intersects the base line of the picture; which intersection is the station point.

#### Example.

In Plate IV. Fig. 1, C is the center of the picture through which the line C P is drawn perpendicular to the horizon, intersecting the base line at S; therefore S is the station point upon the picture.

Plate  
IV.

#### *To dispose the Object upon the Picture proceed as follows:*

In Example, Plate IV. Fig. 1, the block B 1 is two feet six inches beyond the picture, and eight feet six inches from the station point S, to the right of the spectator. Therefore from the station point S set off the measure upon the base line, eight feet six inches to the point p; and draw a line to the center of the picture C. Then from p set off with the compasses two feet six inches to the point n, equal the distance which the object is *beyond* the picture; and from n draw a line to the point of distance D 2, and it will intersect the former line at 6, which point determines the place of the angle of the block. The same process must invariably be employed for the determination of the situation of all objects, whether their faces be inclined or parallel to the picture; for in all cases nothing more is

K k 2

required

SECT. VI. required than to obtain the representation of the *point* or *angle*  $\epsilon$ , after which the form of the object is to be completed by the rules taught in the instructions given in the first, second, and third Sections of this work.

In drawing the perspective representation of a building it will often be found inconvenient to place it beyond the base line of the picture, as observed in a former part of this work \*; because the measures are not so easily transferred to the object as when the angle of the building touches the base line or intersection of the picture.

But it frequently happens that there are projecting parts which advance beyond the general line of the front, as in the Example of the garden building, Plate XVII. where the center part containing the arch projects. In which case either the main body must be thrown back beyond the base line, to leave room for the projection, or the projection must be added by the inverse process, after the general form of the building is determined. The latter method being the most convenient, shall be explained by the Example Fig. 2,

Plate  
XXXVI.

Plate XXXVI.

In this Figure it may be supposed that the building A A, is already drawn, touching the ground line or intersection of the picture at a.

At the point b it is required to add the projecting part B D to the front A A.

The side D of the projection required, is parallel to the end E of the building; consequently it has the same vanishing point, which is V 2.

Therefore through b, the point of union, draw a right line from V 2; which will determine the base of the side D, as the line b c.

The distance of the vanishing point V 2 is d v 2; therefore from d v 2 draw a line through b that shall cut the base line, as in f.

From f set off to g on the base line, the measure of the depth of

\* See Note, page 128.

the

the side D, by the scale 1 foot, and return a line from g to d v 2; which will give the intersection c, the depth required.

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Plate  
XXXVI.

Then determine the breadth of the front B, as follows :

The face B, of the projection, is parallel to the front A; therefore draw a line from the point c to the vanishing point V 1, and cut off a portion of that line equal to the required breadth of the projection.

From the point d v 1 draw a line through c, which may intersect the base line G in the point o, and from the point o set on upon the base line two feet by the scale to the point K; and from K draw a line to d v 1, which will intersect the line that is drawn from the point c, to V 1, in the point m; then is the line c m, the representation of the base of the front of the projection B D.

Complete the general form of the projection as follows :

At the points b, c, and m, draw lines perpendicular to the horizon.

Then through the intersection g, draw a line from the vanishing point V 2, which will produce the point h; from which point draw a right line to the vanishing point V 1; and the form of the projection will be completed.

The foregoing instructions are founded on the same principle, and teach the same process with that which is given in page 139, and Plate XX. by which the open door is determined in its measures by the inverse process; which may be employed in those cases where the representations of projecting parts are to be added, that shall correspond in dimensions to a part or side of a building, the general form of which is previously determined.

*Of the Distance and vanishing Points when beyond the Limits of the Tablet or Picture.*

The student, in considering the foregoing Sections, may probably be perplexed to apply the rules which are there given for disposing the  
the

SECT. VI. the place of the eye, and the consequent vanishing points; seeing that in most of the Examples, those points lie beyond the boundaries of the tablet or picture; and therefore he may be inclined to object that those rules are inconvenient, if not wholly useless to the painter.

To obviate the inconveniences above-mentioned, Dr Brook Taylor first, and some of his successors after him, have given methods which may be employed, upon particular occasions, by those who wish to acquire a perfect knowledge of the science of Perspective; and to be acquainted with the best methods of facilitating the course of operation in difficult cases; of which the two following are the most useful, and therefore the best calculated for the service of the artist.

*Case the first.*

When the objects have their component lines and planes *parallel* and *perpendicular* to the picture, and the canvas or tablet is too narrow to contain the full distance.

*Case the second.*

When the objects have their component lines and planes inclined to the picture, in consequence of which both the *distance* and the *oblique vanishing points* fall beyond the dimensions of the canvas.

*Process for the first Case.*

In the first, where the distance of the picture is laid down on the horizontal line, and the canvas or tablet proves too narrow to receive it; take half or a third of the distance, and in the same ratio employ the measures for the proportion of the given figure.

Thus if the distance is 20 feet, and the measure of the line is 6 feet, if half the distance 10 feet is employed; take half the measure of the original line 3 feet, and the effect in the representation will be the same as if the greater dimensions were employed.

Example,



## Example, Fig. 2. Plate IV.

SECT.  
VI.  
Plate.  
IV.

Suppose the block B is to be represented in Perspective, and the canvas or tablet be limited by the line marked A, in which case there will be no room to employ the whole distance, which is about 18 feet.

The cube is 4 feet square, and about 4 feet beyond the picture.

The feat on the picture of the nearest angle of the cube is at 1: therefore set on upon the base line 4 feet, from 1 to 3; and draw right lines from 1 and 3 to C, the center of the picture.

Then take *half* the *distance* of the picture, and set it on the horizontal line from C to D, that is 9 feet, being the half of 18 feet.

Then cut off the proportion of those indefinite lines, which are drawn from 1 and 3 to C, as follows:

The cube is 4 feet beyond the picture; therefore take half the measure, which is 2 feet, and set it on from 1 to 2; and from 1 and 2 draw right lines to D, and the intersections of those lines, with the line which is drawn from the point 3, to the center of the picture C, as at the points 8 and 9, will give the perspective dimensions of the base of the cube, and also of its distance beyond the picture.

If any other proportion was employed, as one-third or one-fourth, the effect would be the same.

*Process for the second Case.*

In Plate XXXVII. Fig. 1, an Example is given of the outlines of a building, the sides of which are inclined to the picture; consequently the lines O M and O N, as also the lines a p, and a R, tend to vanishing points, which being beyond the limits of the tablet cannot be employed; but it is required to draw those lines, for which purpose the following process must be employed.

Plate  
XXXVII.

Let

SECT. VI.   
 Plate XXXVII. Let A B represent two faces of a building whose sides are inclined to the picture, the upper lines of which are O M and O N, which tend to the vanishing points V 1 and V 2 ; but are drawn without the assistance of those points.

The center of the picture is C the eye, is at E, the horizontal line is H.

Find the point a, which is the feat upon the ground of the nearest angle of the building, by the process already given \*, and draw the vertical line a O, which will be the nearest angle of the building †.

The prime vertical line is C E, and the space between C and E is the distance of the picture ; but it must be particularly observed, that upon this occasion the whole distance cannot be employed, because the angles when constructed at E, subtend so much, that the vanishing points produced by those angles are out of the picture ; therefore a less, but proportionate distance is employed, which in this Example is one-third.

Suppose the real distance of the picture to be thirty feet, take ten feet, which is one-third, and set it up from C to b, and suppose b to be the distance of the picture ‡.

At the point b draw the line P P, parallel to the horizontal line, and consider that line as the parallel of the picture ; then draw the line b, e, making the same angle with the parallel of the picture, that the side A of the object makes with the picture ; which in this Example is 36°, and draw the line b, e, which will produce the point e, by its intersection with the horizontal line.

\* In Page 99, Fig. 2, Plate XL.

† The point S is the feat of the point a, upon the picture, and the space between S and Z is equal to one-third of the distance of the point a, beyond the picture.

‡ The student, who is not a proficient in the second and third sections of this work, must not attempt the solution of the problems which are here given, for they can never be understood by those who have not pursued the study progressively.

At the point e draw the line e P, perpendicular to the horizontal line H.

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Plate  
XXXVII.

Then divide the space between C and b, into three equal parts, as is marked in the Example, and take two of those parts, and set up from e to g, then will the line e g be two-thirds in height of the line C b.

Draw a line from b through g, and it will tend to the vanishing point V 1.

Then find the line O M as follows:

O is the upper angle of the building, which was found by the methods given in the former sections; and a O is the angle formed by the two sides A B, which line is intersected at x by the line b g.

Therefore divide the space between W O, in the line a O, into any number of equal parts, so that the space between x O, may be to that between W x, in a given ratio; which in the Example is as 3 to 2. Then divide the space between e g, in the line e p, in the same ratio with the line W x, which is three equal parts; and from g set up to p two of those parts, and draw a line from O through p, and it will tend to the vanishing point V 1.

The same process repeated will produce the line N O, as follows:

Draw the line b f perpendicular to the line b e, which will intersect the horizontal line in the point f.

At the point f draw the vertical line f h; and from f set up to h two parts, equal two parts in the vertical line C b\*, and draw the line b h.

Continue the line b h till it intersects the nearest angle O a of the building, as at k.

\* Observe that the space between C and b must be divided into the same number of equal parts by which the space C b is proportioned to the whole distance of the picture, as C 1 : C b :: C b : C E; that is, C 1 is to C b in the same proportion as C b is to C E. These proportions must be particularly attended to, otherwise the operation will not be correct.

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Plate  
XXXVII.

Divide the space between  $w$  and  $k$  in the line  $a O$ , into any number of parts equal  $k O$ ; as in this Example it is as 4 to 1.

Then divide the space between  $f h$  in the line  $f N$  into four equal parts, and set up one from  $h$  to  $N$ , and draw a line from  $O$  through  $N$ , and it will tend to the vanishing point  $V 2$ ; therefore  $O M$  and  $O N$  are the lines required, which represent the upper horizontal lines of the building.

To obtain the lines  $a P$  and  $a R$ , which represent the base lines of the building, proceed as follows:

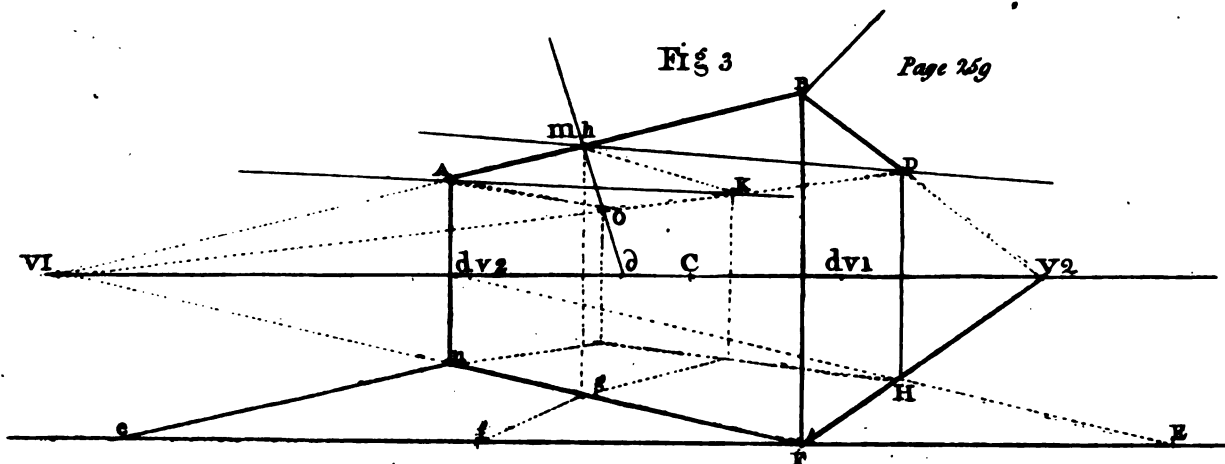
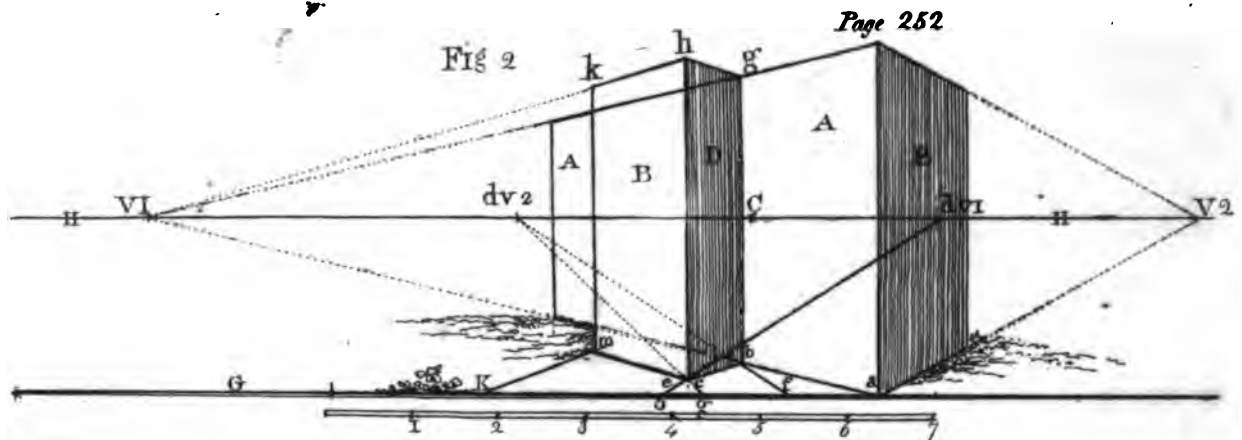
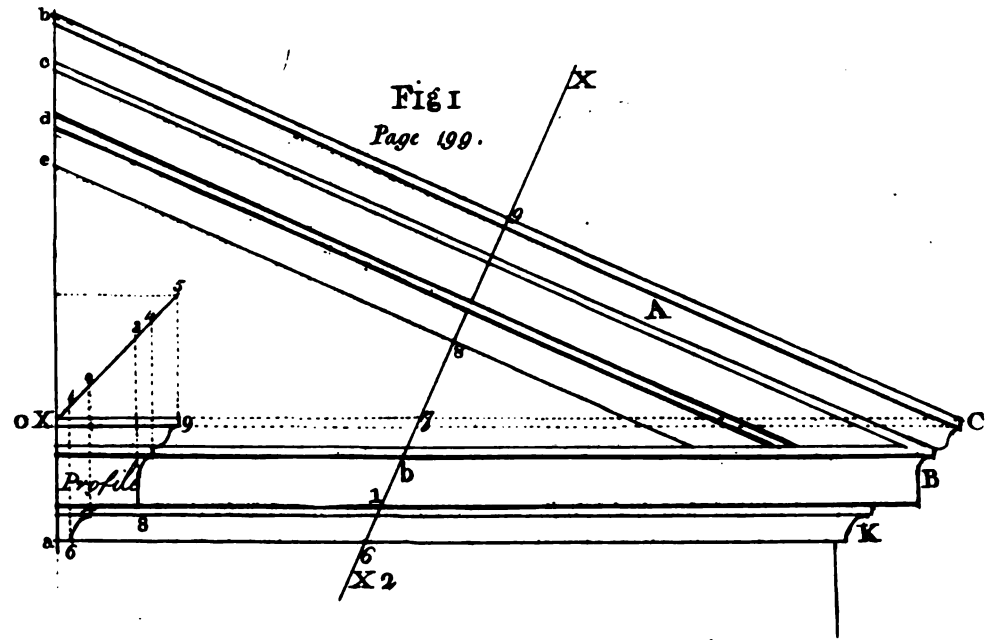
Make the space between the point  $S P$  in the same ratio to  $S M$ , as the space between the points  $a W$  is to  $W O$ ; and from  $a$ , draw a right line, through  $P$ , which will also tend to the vanishing point  $V 1$ , and represent the lower line of the side  $A$  of the building. The lower line  $a R$  of the side  $B$  must be determined by a similar process.

It must be confessed that this process, though elegant and scientific, is yet so tedious and laborious, and requires so many lines, that no artist can be expected to practise it. It will be far more prudent to place the drawing or picture in such a situation as may admit of introducing the vanishing points, as directed in the third section. But if the work is very large, as in a scene, it will be best to make a small drawing to a proportionate scale, and transfer the small, by regular measures, to the large work required.

### *Of the Diagonal or Mitre Line.*

As it is often inconvenient or almost impossible to introduce the vanishing points for the diagonals or mitre lines, by which mouldings are to be represented upon the remote angles of a building, it will be proper to give an Example to demonstrate how such mitre lines may be drawn without the assistance of vanishing points.

Example





## Example, Plate XXXVI.

SECT.  
VI.  
Plate  
XXXVI.

The front A B, n F of the building A D, Fig. 3, is inclined to the picture, and it is required to draw the diagonals or mitre lines h D and A K; the vanishing points of those lines not being within the limits of the tablet or canvas.

Let n represent the farther angle of the base, and A the upper angle of the farthest end of the building.

From the front A cut off a portion of the line A B, equal to the dimensions of the depth of the building, as from A to h, equal B D; by the following process:

The vanishing point of the lines A B and n F, in the front of the building C, is V 1, and its distance is d v 1; therefore through the farther angle n, draw a line from the point d v 1 that may cut the base line, as at e.

Then from e set on upon the base line to f, the measure of the depth of the building, equal the space from E to F in the base line; and from f draw a line to the distance of the vanishing point d v 1, which will intersect the base line of the building at g, consequently the space n g is equal F H, perspectivevely determined.

At g draw a line perpendicular to the horizon, as the line g h, and from h, draw a line to the vanishing point V 2.

From D, which is the remote upper angle of the depth of the building, draw a line to the vanishing point V 1, and it will intersect the line drawn from h to V 2 in the point K.

Thus will the line A h represent the front, and the line o K the back of a square, the sides of which are represented by the lines h K and A o; all of which are equal in dimensions to the depth of the building represented by the line B D; therefore through the points A K and h o draw right lines, which will be the diagonals required, as shewn in the Example.

SECT. VI. The line m D is the mitre line for determining the projection of the mouldings at the remote angle D of the building; it is found by marking off a portion of the line A B from B equal to the line B D, which is the depth of the building.

Plate  
XXXVI.

It must be observed, that the principle upon which the foregoing process is founded, is to resolve the upper part of the building into two regular squares, whose sides shall be equal to the *depth* of such building; then through the opposite angles of those squares to draw right lines, which will represent the diagonals or mitre lines required.

*To cut off or proportion the Dimensions of Lines, when inclined both to the Horizon and to the Picture.*

Although this process has been already given in the representation of the lid of the box, Plate XXIX. and page 194; yet, as that Example may appear confused to the student, it was thought necessary to repeat those instructions and give an Example, in which fewer lines being employed, both the diagram and the instructions may be more intelligible.

Plate  
XXXVII.

In Plate XXXVII. Fig. 3, is the representation of a block, of which the face A is inclined to the horizon\*, while the side B is inclined to the picture.

C is the center of the picture.

E, the eye or distance.

H, the horizontal line.

G, the ground line or base line.

V 1 is the vanishing point for the line g S.

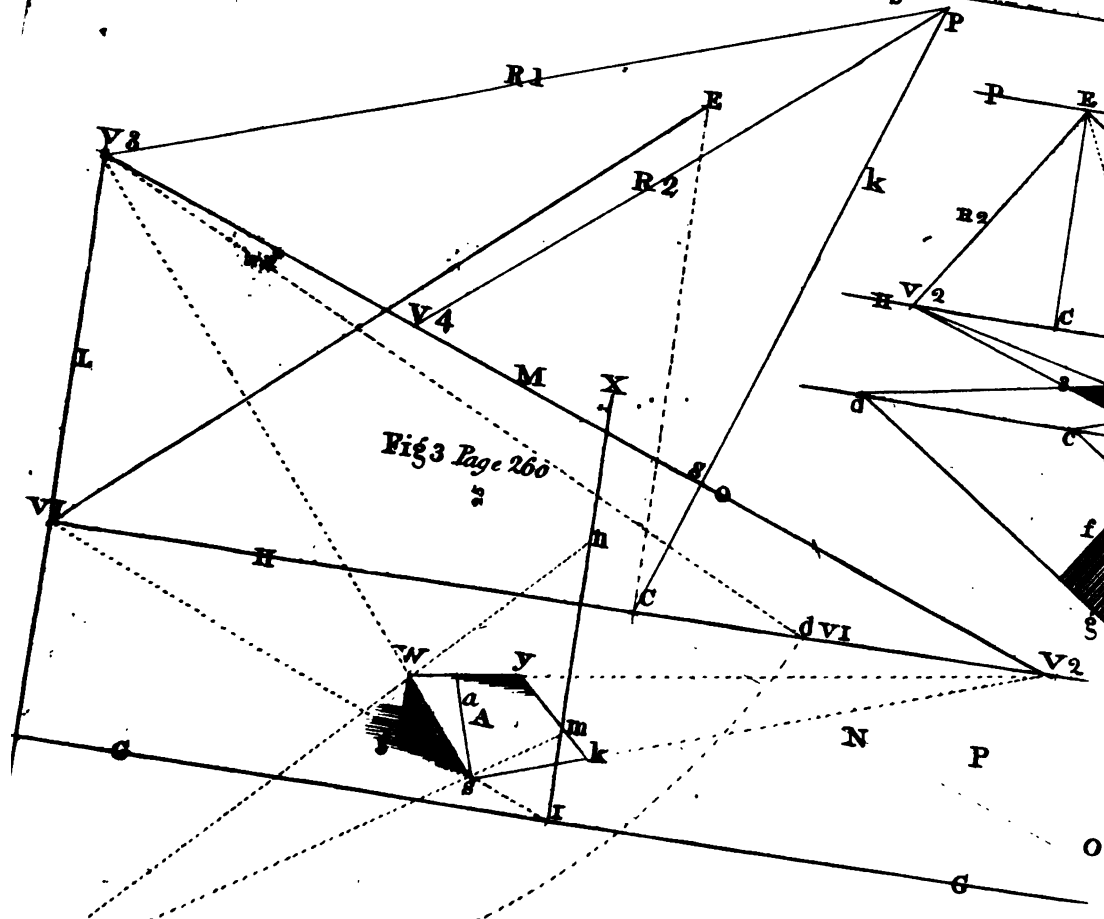
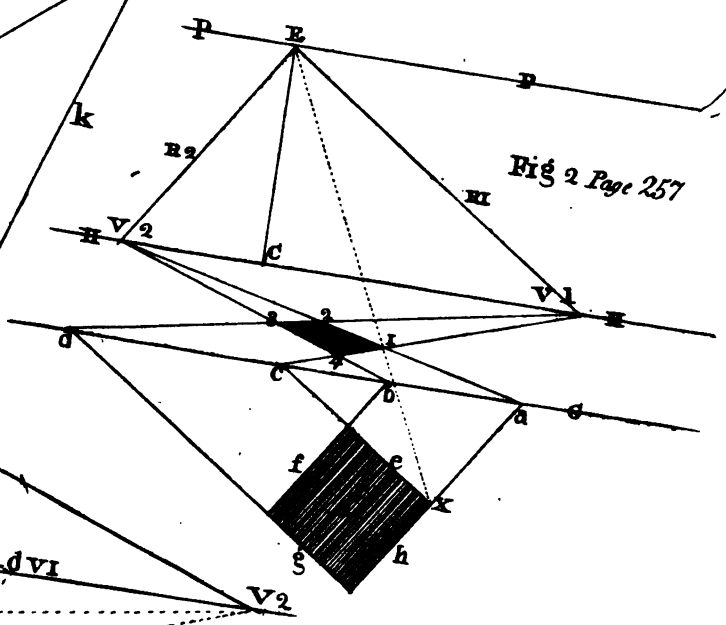
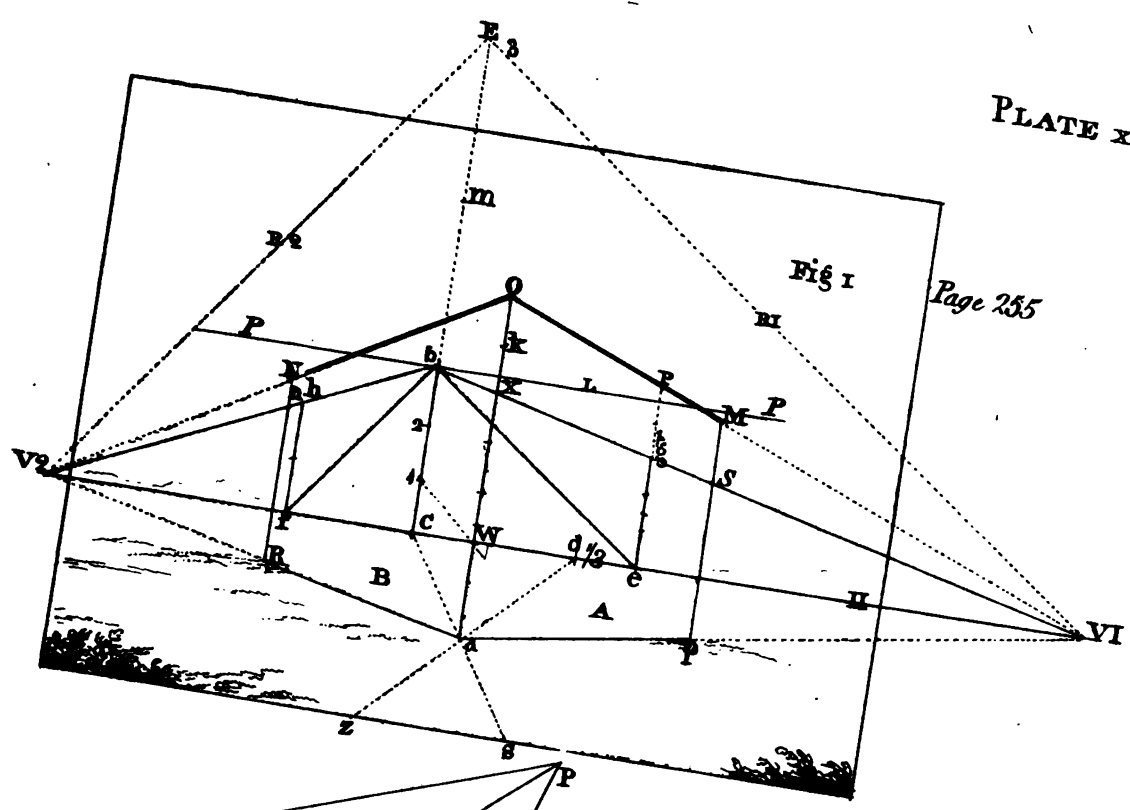
V 2, the vanishing point for the line S k.

d v 1 is the distance of the vanishing point V 1.

\* The angle of inclination in this Example is 26 degrees.

Let







Let it be supposed that the whole of the object is determined except the inclined face A, to represent which proceed as follows :

SECT.  
VI.

Through the point V 1 draw the vertical line L, and continue it below the ground line G, as far as may be thought necessary.

Plate  
XXXVII.

At the point d v 1, construct an angle with the horizontal line, equal the inclination of the face A of the block, to the horizon. Continue the line which forms the angle till it cuts the line L in the point V 3, which will be the vanishing point for the inclined lines S W and k y of the face A of the block.

Let S be supposed the nearest angle of the base of the block; therefore draw the lower lines S k and S g, to their vanishing points, and cut off their dimensions by the methods already given in the third Section. Page 99, Plate XI, Fig. 2.

Continue the line g S, from the vanishing point V 1. till it cuts the ground line of the picture at I; and at I draw the line I X parallel\* to the line L, which line is to be considered as the intersection of the side B of the block, with the picture.

At the point V 3 take with compasses the length of the radial from V 3 to d v 1, and mark that length upon the line L downward, as at the point d v 3; which is the distance of the vanishing point V 3.

Then from the point d v 3 draw a line through the angle S of the block, which may cut the line I X in the point m; from which point set up to n the measure of the inclined face of the block, and draw a line to the point d v 3, which will give the intersection W. Then is S W the measure of the inclined face of the block, which was required.

The foregoing process will be better understood by considering the figure as follows :

Turn the diagram round, and suppose the line L to be the hori-

\* The line X I, being the intersection of the picture, by the side B of the block, must be parallel to the line L, because that is the vanishing line of the side B.

zontal

SECT. zontal line, and the line I X the ground, or base line; for the line L  
 VI. is the vanishing line of the side B of the block, and the line I X is  
 Plate the intersection of the side B with the picture; and as the lines S W  
 XXXVII. and S g are both in the plane, whose vanishing line is L, the vanishing  
 points of those lines must be in the line L, they are V 1 and V 3;  
 and as the line I X is the intersection of the picture by the plane B,  
 all the lines in that plane which incline to the horizon and vanish  
 into the line L, may be proportioned by the measures applied to the  
 line I X.

*To find the Center and Distance of a vanishing Line. Fig. 3.*

The line M, which is drawn from V 3 to V 2 is the vanishing line  
 of the inclined face A of the block, found as directed in the fourth  
 Section\*.

The center of the picture is C, and E is its distance.

From the point C draw a right line *perpendicular* to the vanishing  
 line M†, and continue it as far as may be thought necessary; observing  
 that it intersects the vanishing line M in the point S, which point is  
 the center of that vanishing line. Its distance must then be deter-  
 mined as follows:

At the point C draw a right line parallel to the vanishing line M,  
 as the line N O.

Then with compasses take the distance of the picture; that is the  
 space from C to E, and set it upon the line N from C to O.

Then from the point O draw a line to the point S, as the line P,  
 then is the length of the line P (or, which is the same thing) the  
 space between the points O and S, the distance of the vanishing  
 line M.

\* See page 193, Plate XXVIII.

† By the process given in page 6, and Plate I, Fig. 3.

If it were required to represent lines upon the inclined face A of the block, it would then be necessary to employ the distance of the vanishing line M, in which case take the length of the line O S, and set it up from S to P, upon the line k; then is S P the center of the vanishing line M, and P\* is its distance.

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XXXVII.

Then suppose the line S a is to be drawn upon the surface A, inclining to the side S W of the block, in an angle of 20 degrees.

From the point P draw the right line R 1 to the vanishing point V 3, which line will be the radial parallel to the original line S W; therefore at the point P, draw another right line, making the same inclination to the line R, but within it, as the original line of S a is known or supposed to incline to the side S W, as the line R 2; and its intersection V 4 with the vanishing line M, will be the vanishing point required. Therefore from any point in the lower part of the face A of the block, draw a line to the point V 4, and it will be the representation of a line inclined to the side S W, in an angle of 20 degrees.

The foregoing problems, which are demonstrated by Figure 3, Plate XXXVII. do properly belong to the fourth Section, but being intricate and abstruse, it was thought better to give them detached from the Examples of that Section, which are wholly practical; yet, in their present appearance too much incumbered with lines, to admit of any addition, that might produce confusion in the mind of the student.

\* The point P may be considered as the eye of the spectator, equally with the point E, for if the various planes represented in the diagram, were folded and raised in the proper positions, the points O, P, and E, would all coincide or meet each other; the demonstration of which has been attempted by Professor Cowley, Mr. Kirby, and the senior Malton; all of whom have been more attentive and successful in their theoretic demonstrations than in their practical instructions; but as such demonstrations cannot be understood by those who are unacquainted with the principles of Geometry, the author of this Treatise has not attempted to give such schemes or figures which would be unintelligible without the help of a master.

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VI.

Plate  
XXXVII.

It is also to be observed, that these problems must be considered in the following order :

First, the method for determining the measures of lines inclined to the horizon.

Secondly, the process for finding the center and distance of the vanishing line of an original plane *inclined* to the horizon. And,

Thirdly, determining the vanishing points of lines in a *plane inclined* to the horizon.

*Observations by way of Praxis.*

In the foregoing Sections of this Treatise the author has endeavoured to instruct the student in the practical part of the science of Perspective; but, lest he should not be perfectly understood in those essential points, the *center* of the picture, and the *disposition* of the object to the picture, he has subjoined some observations as a Praxis, containing Examples of errors, with their corrections; which will at one view demonstrate more than can be explained by more prolix instructions, given in any other form.

The Examples which are employed, although few in number, exhibit errors that are very generally committed, even by those who pretend to be skilled in Perspective. But in making this remark, the author by no means wishes to expose or condemn the works of any living artist, he only seeks to instruct; and has therefore referred for proof to the works of those only, who can no longer be injured by censure nor benefited by praise.

Plate  
XXXVIII.

Plate XXXVIII. or 1st of Praxis, Fig. 1 and 2.

Represent two small houses or villas, seen in different directions. In the first the face A is parallel to the picture, and the center of the picture is at C, which is out of the limits of the tablet.

This disposition is extremely improper, because no person would  
stand

and to view the building, and look at the point C, for in that case the house would only make a part of the view, but could not be the object at which the spectator was looking.

SECT.  
VI.  
Plate  
XXXVIII.

In Fig. 2 the center of the picture falls on the building at C, which is the just position; and the sides of the objects are all inclined to the picture. This will ever be the appearance when the most natural and direct view is taken of such a building, as is represented in this Example.

In Mr. Kirby's folio Treatise of the Perspective of Architecture, is an Example exhibiting the same defect with that given in Fig. 1. It is a view of Whitehall Chapel, the front of which is parallel to the picture, consequently the spectator cannot be considered as looking at building, but at some other object; and therefore it is no more than a part of a view, the whole of which is not seen.

Fig. 3 and Fig. 4.

Represent views of objects similar to each other. The banks of a river, with a bridge, Fig. 3, is an improper, and Fig 4, a proper choice of the view.

To understand these Figures perfectly it must be remembered, that all bridges are constructed at right angles with the banks; to which they form a mutual communication: consequently if the banks be described as parallel to the picture, the bridge will be perpendicular to it.—such is the disposition of those objects in Figure 3; but this Example exhibits a very improper choice of view, for the center of the picture, or what is called the point of sight, is at C 3 out of the tablet or picture; consequently the spectator is not looking at the bridge, but at some object, which is not comprehended in the view or picture.

M m

In

SECT.  
VI.

Plate  
XXXVIII.

In Figure 4, the center of the picture is over the farthest arch of the bridge at C 4; consequently within the limits of the tablet; and all the objects are oblique to the picture, which is perfectly just and natural; for let it be supposed, that a painter standing on-either bank means to delineate the view of a bridge, he will certainly look at the bridge; consequently the *axis* of the cone of visual rays will not be parallel to the bridge, as in Fig. 3, but will intersect it obliquely, as in Fig. 4; and thus all the objects which compose such a view, will have the sides oblique or inclined to the picture, the vanishing points of which may be A and B 4.

It is true that the rules of Perspective are not violated in the Examples Fig 1. and Fig. 3. but the principles by which they are applied is false, occasioned by the improper disposition of the center of the picture; or, as it is improperly termed, the point of sight.

The foregoing observations are intended principally to exemplify the proper and improper disposition of the center of the picture. It will in the next place be necessary to make some remarks upon the frequent inattention to the oblique vanishing points.

Plate  
XXXIX.

In Plate 2 of Praxis, are three Examples, Fig. 3, 4, 5; which are different representations of the same object: which may be considered as a walled town, situated upon an eminence, considerably above the eye of the spectator.

Of these Examples Fig. 3 is false and absurd;

Fig. 4 is improper, though not false;

Fig. 5 is its perfect and just delineation.

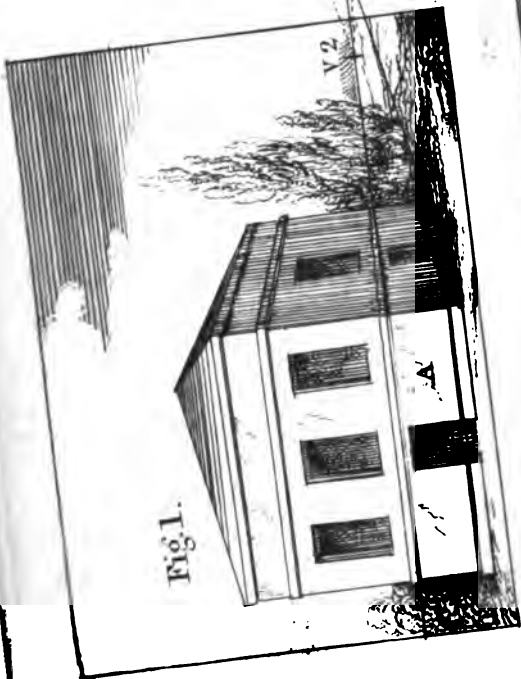
In each of these Examples the walls A and D are at right angles with each other; but in Fig. 3 \* the side of the wall A, which by

\* The Example, Fig. 3, is extracted from a work of great merit in other respects.—The same faults are to be seen in the views of Israel Sylvester, and many other masters, although their works have great beauty and taste in their execution.

construction



Praxis, Pl. 1.



S. 2.

Fig. 2.

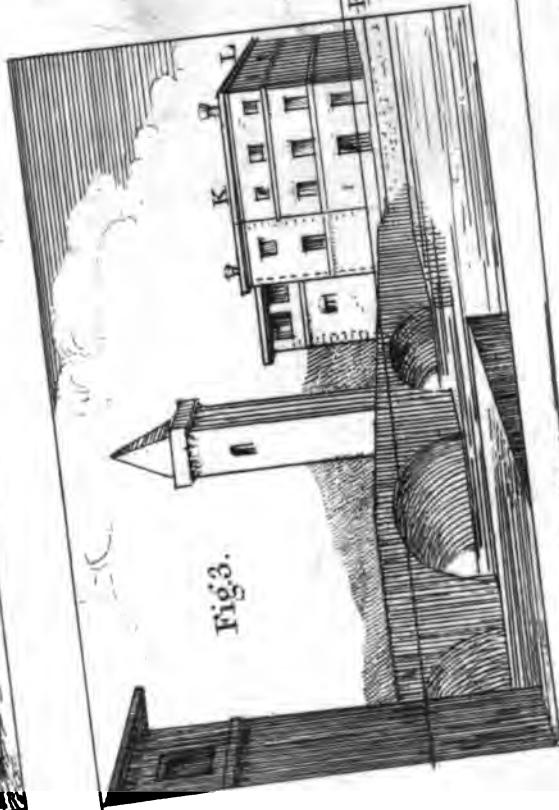


Fig. 3.



Fig. 4.

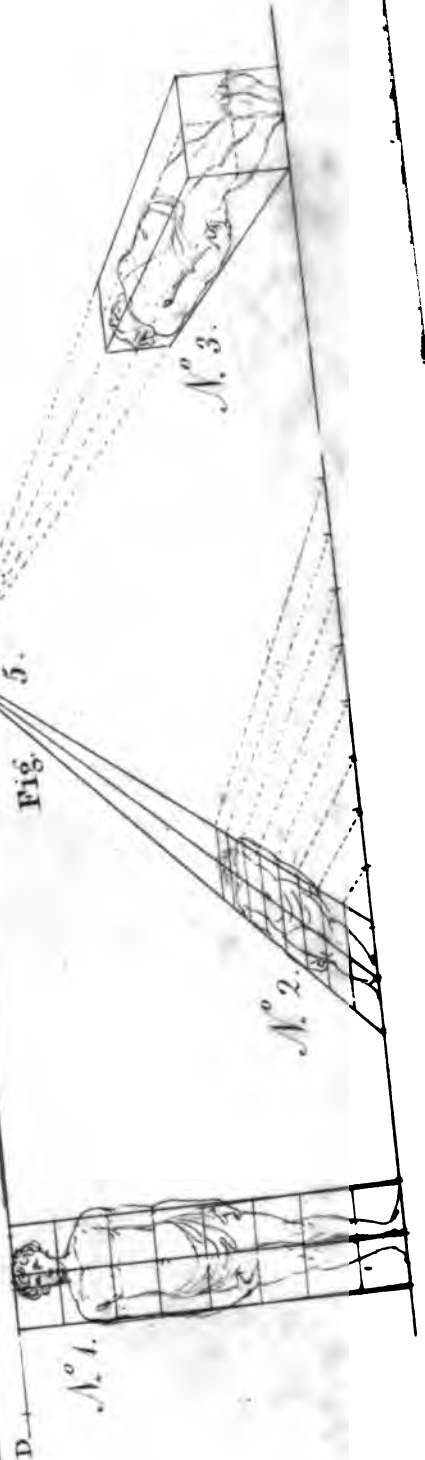


Fig. 5.

N. 3.



construction is inclined to D, and which is indicated to be so by its shadow ; does not vanish into any point, but is absurdly drawn in one continued right line with the side D parallel to the picture. Now this can never be the true appearance, unless the eye of the spectator were in the same plane with the upper lines of the walls, in which case the horizontal line would also coincide with the upper edges of the walls, provided they were horizontal in their construction.

S E C T.  
VI.  
Plate  
XXXIX.

In Fig. 4 the side A of the building vanishes in C, which by the form of the object is determined to be the center of the picture ; but the error of this Example is, that the center of the picture is too near the edge or limits of the tablet, which is improper, since the eye of the spectator would in such view comprehend as much space to the right of C, as is represented on the left, provided the country were open ; which is sufficiently indicated by the species of landscape. Yet this Example is true as far as relates to the rules of Perspective, but, as before observed in the Examples, Fig. 1 and 3 in Plate 1, of Praxis, the center of the picture is improperly disposed ; or rather confounded with some other vanishing point, and the spectator does not look at the object.

Fig. 5 is just, for the following reasons :

The walls A and D are known to be inclined to each other, and the sides of the tower are parallel to those walls. The building B hath its sides parallel and perpendicular to the picture. C is the center of the picture, or, in other words, it is the point in the view at which the spectator is looking ; it is also the vanishing point of all lines perpendicular to the picture ; therefore it is the vanishing point of the side of the building B, which is perpendicular to the picture.

The oblique vanishing points might be found if necessary, by the rules given in the third Section, but when a view of the kind here given

SECT. VI. is to be drawn, the following method will be sufficiently correct ;  
 especially when the objects which are to be described lie remote or  
 inaccessible.  
 Plate XXXIX.

Draw the principal lines of the buildings as they appear to the eye, and then correct them by the following process :

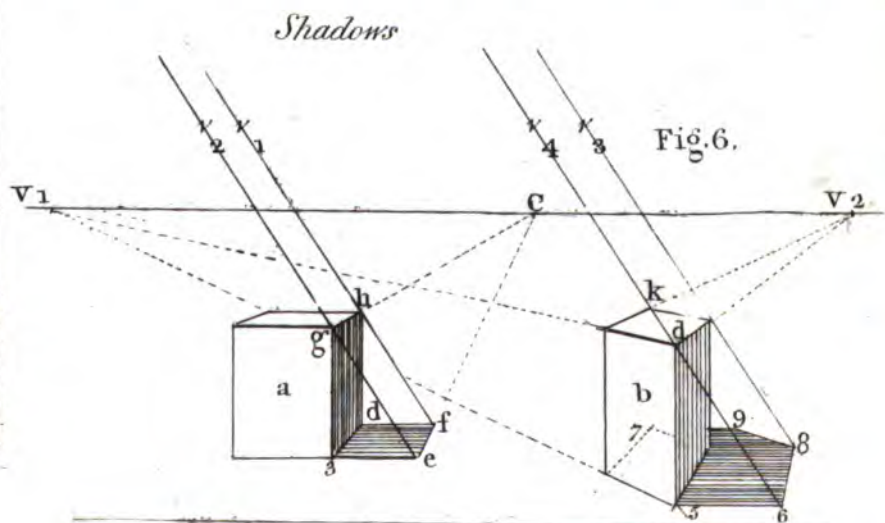
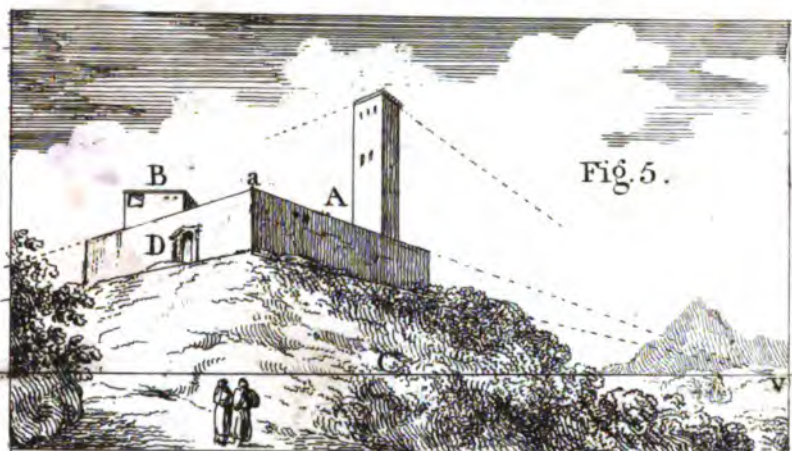
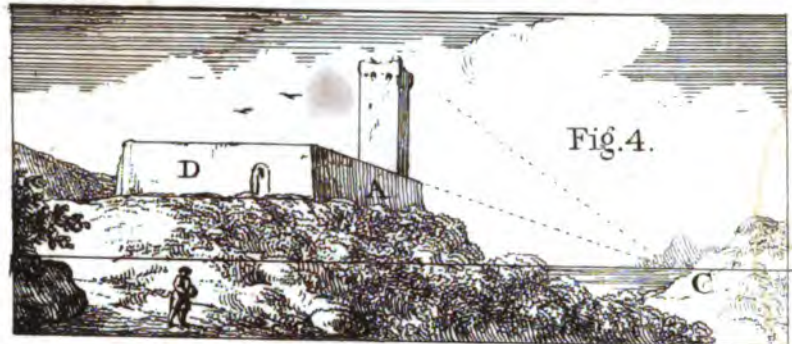
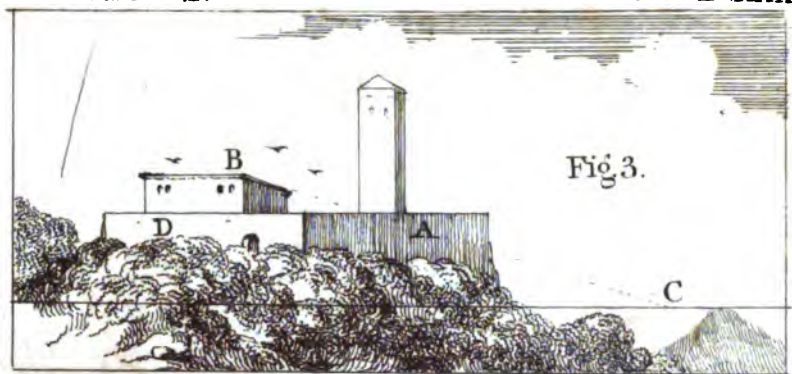
Draw a right line as nearly as possible in such situation upon the picture or paper as shall correspond proportionally with the height of the horizon, in the natural view, as V, C, Fig. 5.

Having drawn the tops of the walls A and D, Fig. 5, apply a ruler to the line A, and mark where the continuation of that line intersects the horizontal line, as at V, then will V be the vanishing point of all lines parallel to the top of the wall ; therefore by this point adjust the other lines, repeating the same process for the side D.

These considerations should be carefully attended to, as they relate to a very material point ; in which the uninformed artist is most likely to err ; for it almost constantly happens, that those who are but imperfectly acquainted with the rules of Perspective, do not discern the difference between the parallel and inclined positions of the objects, but do in general describe a long line of distant buildings as parallel to the picture, when in fact it is inclined.

There are some artists who have asserted that parallel lines have the best and grandest effect in the picture, but this is surely a most erroneous opinion, and those who have adopted it must have been deceived by the following circumstances ; when the objects are distant, the inclination of their sides to the picture appears so indefinite and faint, that their obliquity is not perceived by those who are not versed in Perspective ; therefore let such persons consider the form or plan of the object, and remember, that unless it be a wall *parallel* to the picture, that in all other cases some of the sides will vanish in a point in the horizontal line ; consequently







quently no such building can appear like Fig. 3, but must always be drawn either as Fig. 4 or Fig. 5.

SECT.  
VI.  
Plate  
XXXIX.

Plate XXXIX. or 2d of Praxis.

\* In the following discourse some directions are given concerning the composition of a whole length portrait; particularly in those parts where the rules of Perspective are required; and it is there directed, that, "in every portrait the center of the picture should always fall somewhere on the figure."

The better to explain this precept, and to demonstrate the errors which are too often committed, two Examples are given.

The first, Fig. 1, is correct. The second, Fig. 2, is false.

In Figure 1 the center of the picture is at C, under the left breast of the figure, and the horizon is consequently just above the elbow; the pavement, the table, and all the other objects in that Example have their *constructive lines* parallel and perpendicular to the picture; therefore all those lines which are perpendicular to the picture vanish into C, which is the center of the picture, vulgarly called the point of sight.

Let Fig. 1 be compared with Fig. 2, and it will scarcely be required to point out the errors of the latter, in which all is confusion and absurdity. In the Example, Fig. 2, by the absurd arrangement of the objects in the back ground, *two points* of sight are indicated in one picture; one by the direction of the lines in the pavement, the other by the figure itself. Again, the block or pedestal upon which the figure is leaning, hath the side line of the top vanishing into some point not in the picture; therefore the real form of this object cannot be known, for by its representation it is not explained. The

SECT.  
VI.

Plate  
XXXIX.

column or pilaster is also false and indefinite; yet, it would not be difficult to produce Examples of these inexplicable errors.

In Fig. 2, the horizon is as low as the knees, which disposition makes the figure in this Example appear taller than the other Fig. 1, although of the same size, from which circumstance the painter will do well to remember, that by disposing the horizon higher or lower, he will make the figure appear taller or shorter; and therefore it should be disposed agreeably to the stature of the person represented.

After having exposed the faults which are exhibited in this Example, it may be useful to the student to explain what should have been the construction of this sketch, allowing the horizon to be placed as low as is here represented. Let it then be supposed that a whole length portrait is to be placed so high, that it will be necessary to draw the horizon as low as the knees of the figure; in such case the center of the picture \* would fall either upon one of the knees, or between them; because the place of the eye of the spectator (commonly called the point of sight) would not only be in the figure, which is looked at, but must also fall in the horizontal line. This being premised, the side lines of the pavement should converge or vanish into that point, as they do in Fig. 1. The top of the block *a*, would also vanish, or be drawn down to the same point; the side of the block next the figure should also be described, because it would be seen in nature: in short, the lines in this Example should follow the direction of Fig. 1, because the objects are of the same species. The only difference of the whole is, that the parapet wall in Fig. 1 is omitted in Fig. 2; because it would have concealed the landscape, and the

\* By the disposition of the various objects in this Example, the knees are the only part of the figure to which a line drawn from the spectator's eye, perpendicular to the picture, could cut or intersect it; consequently the center of the picture must be there. See Brook Taylor, Def. 1st. Edition 1st.—See also page 25 in this Treatise.

curtain



## P E R S P E C T I V E.

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curtain is introduced, as is commonly done by those who wish to conceal an awkward corner of their canvas.

S E C T.  
VI.

### Plate XL. or 3d of Praxis.

Plate  
XL.

In this Plate are two Examples which may be considered as illustrations of those kinds of subjects, in which the simple rules of Perspective may be applied in a general way.

\* Fig. 1 is a view of the back part of a village, in which the various objects are differently disposed to the picture.

The horizontal line is indicated at the sides of the print 'by the letters H, H; which line is raised somewhat above the figure of the woman, thereby indicating, that the spectator stands upon ground more elevated than what is seen in either view.

The faces or sides of the wall and pier A, Fig. 1, are perpendicular, and their returns parallel to the picture; consequently the vanishing point for their construction is the center of the picture, which is at C.

The church tower stands obliquely to the spectator; therefore all the horizontal lines which compose its form, are drawn to points in the horizontal line, and if any of the sides of the other buildings are parallel to the tower, they will also vanish in the same points; which is the case with the barn, whose side F vanishes in b, the vanishing point of one side of the tower.

These points need not be determined by strict rule, but having made the sketch from nature, as correct as the eye can decide, lay a ruler to any one of those lines, as the top of the parapet or the upper edge of the window, and continue such line till it intersects

\* In views of this kind, it is scarcely possible that the objects should be situated in more regular order than is represented in this Example; the student is therefore advised to consider it with attention.

the

**S E C T.** the horizontal line; and that interfection will be the point, which  
**VI.** must determine all the lines in that side of the tower.

**Plate**  
**XL.**

The same process must be repeated for the other side of the tower, and the other objects of the view.

**Example 2d, Plate XL.**

The second Example, Fig. 2, represents the view of a street, composed of many buildings, the fronts of which are all, except those marked A and B, inclined to the picture in different angles,

The building A, which represents a chapel, and its opposite marked B, are parallel to each other, and perpendicular to the picture: consequently the lines which are horizontally disposed in those fronts, vanish in the center of the picture.

The horizontal line is indicated by the letters H, H, as in the former Example, and is raised to the top of the doors of the nearest buildings.

The center of the picture falls near the door of the farthest building at C.

The student must observe, that though the general form of the street appear curved, yet the fronts of all the houses are planes: consequently all the horizontal lines in those fronts are right lines, which vanish in different points in the horizontal line; therefore when views like this Example are to be delineated, let the general form be first drawn out as correctly as possible by the eye, after which lay a ruler to the upper or lower line of the building, and draw a right line that shall intersect the horizontal line, as the upper line of the building A, when continued, cuts the horizontal line at C; therefore C is the vanishing point for all the lines which represent lines disposed horizontally in the front of that building; and also of that which is parallel to it, marked B on the opposite side of the street.

It must be observed, that if the street were built in a straight line, the center of the picture would then be the vanishing point for delineating

neating the fronts of all the buildings, as it would be absurd to attempt the view of a street so built by any oblique vanishing point. Therefore if a view be taken of a straight street, or the interior of a building of great length \*, let the center of the picture be the vanishing point of the sides of the street, or of the building; for this will produce the most natural and pleasing effect.

SECT.  
VI.  
Plate  
XXXVII.

*Of Figures foreshortened.*

In the quarto edition of Mr. Kirby's Perspective † there is an Example, "to put the human figure into Perspective," as foreshortened.

In the instructions explaining the process he observes, that "it is impossible to give rules for putting the human figure correctly into Perspective;" and he is certainly right. Yet having made the assertion, it is matter of surprize, that he should not only attempt an impossibility, but also give an Example, which is entirely erroneous. For his diagram, which is a copy from A. Bosse ‡, does not demonstrate how the figure itself can be drawn in perspective, but only how the *picture* of a figure may be abbreviated or foreshortened.

The process is as follows:

First, the outline of the figure is drawn; after which it is reticulated as at No. 1, Fig. 5, Plate XXXVIII.; the reticulation is then thrown into Perspective, as at No. 2, C being the center of the picture, and D its distance; and the foreshortened outline is drawn by the help of the abbreviated articulation.

Plate  
XXXVIII.

To prove the error of his diagram, it is necessary to observe, that

\* Portland Place and the interior of Westminster Abbey are two excellent Examples for the student's consideration, and will demonstrate the propriety of the instructions here given.

† See Plate XX. Book 2d, of his quarto work.

‡ *Moyen de Pratiquer la Perspective*, Paris 1653, small octavo.

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by

SECT. VI.   
 Plate XXXVIII. by the laws of the science it is impossible that the perspective *representation* of any *solid* figure, as seen in one direction, can by abbreviating or foreshortening the plane of such perspective projection, produce the true appearance of the same object, as seen in another direction; therefore his scheme is wrong, allowing the possibility of applying rules for the delineating of foreshortened figures\*.

After having censured Mr. Kirby's attempt, it may very naturally be expected that some observations and instructions should be given, which may both justify the censure and also direct the artist in the best possible methods of applying rules (if any can be given) for the foreshortening of figures. For this purpose the Figure 5, No 3, in Plate XXXVIII. is offered, in which Example the Figure is considered as contained in a parallelopiped, which is divided into cubes, equal in dimensions and number, to some determinate proportion of the body, as repeatedly contained in the whole. These divisions will give lines and points, when disposed perspectively, which will serve as guides for the general contour; but it is only the masterly hand, the correct eye, and the profound knowledge of the artist that can render it when completed worthy of notice.

As it is evident from the foregoing observations, that the rules of Perspective can afford the artist little assistance in foreshortening his figures, it may not be improper to make some observations and give some hints, abstracted from the rules of the science, which may assist him in this difficult task.

First, it must be observed, that foreshortened figures are seldom introduced but in horizontal ceilings, or in vertical pictures placed at a great height above the spectator; in both which the figures are supposed to be placed upon horizontal planes, above the eye.

Secondly, it must be considered, that if a man be laid down upon

\* Mr. Kirby's diagram is the foreshortened *picture* of a figure, not the *figure* foreshortened.

a horizontal plane, as upon the floor, with his limbs disposed as standing; such figure, when viewed by a spectator placed at the feet of the figure, with his eye raised above the plane of its surface, will exhibit the same appearance as would be produced by a man standing aloft when viewed by a person who stood below.

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This similarity of appearance will follow by the laws of vision; for in both cases the original figure, although very differently situated with respect to the natural horizon, may yet be disposed in the same direction to the axis of the cone of visual rays, or angle of vision of the spectator.

Therefore the artist may assist himself greatly by disposing living models upon the floor of his study and setting their limbs in the actions required; taking care to elevate his eye above the plane upon which his model is placed, so as to produce the desired appearance.

Another method is said to have been practised by Michael Angelo, and other old masters; which was to cast or model small figures in wax in the actions required, and then suspend them aloft, and from those to make the necessary studies. A small lay figure will be a very good model for the same purpose, and an excellent guide for the general disposition and appearance of the limbs, in all situations and actions.

In concluding this Section, which is the last of the Perspective, it cannot be improper to subjoin the following observations.

The artist who shall think proper to consult this work, in hopes to improve himself in the science of Perspective, must pay particular attention to the *second* and *third* Sections; because they contain Examples constructed upon principles which constitute the basis of the science, and furnish the means of practice in all those cases that are constantly required by the painter.

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VI.

Yet it may be necessary to remark, that in the course of his examination of those Sections, he may observe that the distance of the picture, in some of the Examples, is rather too short; this defect in some of the Plates, follows from the want of greater space; but in others it was so disposed, in the hope of rendering the Example more explicit, as in the case of Plate XXVI. where the distance of the picture is much too short; by which circumstance the object appears rather distorted, but at the same time it is by that circumstance rendered much more intelligible than if the Example had been more elegant in appearance.

And here it will be proper to observe, that the artist should pay particular attention to the distance of the picture; because an improper choice of distance will produce very unpleasing effects. It cannot therefore be improper to reconsider this subject, and to add some additional instructions illustrated by the Example of an edifice, whose magnitude and grandeur render it a fit subject for the consideration of the artist who studies Perspective.

Suppose that it be required to produce a perspective view of the exterior of St. Paul's Cathedral, it should be considered whether the representation of the edifice only, or a view of the building and place, are to be drawn as they stand; for these are two very distinct cases; and therefore require different principles for their production.

If a view of the building only be required, as in the first case, the distance of the picture should correspond with the dimensions of the object either to its length or height; which in the given Example is about 500 feet: therefore the distance of the picture should at least be the same; and the station may be supposed at the pleasure of the artist, as shall produce the best effect to the whole.

In the second case, if a view of the edifice, *as it stands*, be required,

quired, it should be remembered that there is no station to be found but what is too near to comprehend more than a partial view, in which the upper part rises above the angle of vision of the spectator; consequently the representation, if drawn strictly just, could not comprehend the whole height of the building, but about two-thirds only, the rest should be supposed as above the picture; but as such a partial representation will seldom please, it may be prudent to add the upper part by the rules of the science.

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Yet here it must be observed, that such addition will exhibit the upper lines of the building as inclined, or raking, too much to be pleasant to the eye; but such unpleasing appearance is not to be attributed to any defect in the science, but rather to a circumstance that may justly be termed, the necessity of the case; which demands that more shall be represented than can be seen at one point of view.

The foregoing circumstance, together with other similar difficulties, which sometimes occur in the practice of Perspective, often draw forth the censures of those who are unskilful in the science; but such may rest assured, that the rules of Perspective as taught by Dr. Brook Taylor in his principles, are perfectly just, being founded on the laws of vision, supported by geometrical demonstration, therefore not to be condemned by those who, from inability or indolence, neglect those studies, which are necessary to form the correct critic, or the masterly artist.

END OF THE PERSPECTIVE.





A  
DISCOURSE  
ON THE  
APPLICATION OF  
*THE SCIENCE OF PERSPECTIVE*  
IN THE  
COMPOSITION OF A PICTURE,  
AND  
OTHER WORKS OF ART.



## D I S C O U R S E, &amp;c.

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**T**HE study of Painting has ever been ranked among the noblest exertions of human genius; for to excel in this art, requires a mind sufficiently vigorous to combine the study of nature with a knowledge in many sciences, the union of which is necessary to direct and mature the talents of a Painter.

The common obstruction which has impeded many artists in their progress towards perfection, is their great neglect of all those preparatory studies which are necessary to the accomplishment of a painter: for most students, and too many teachers in the art, deem it sufficient to copy art; and then without any reference to, or assistance from those sciences, by which we are taught how to examine nature, and to select her beauties, directly apply themselves to the vulgar imitation of her various forms, with no better guide than an eye undirected, and a mind uninformed.

With such an imperfect education, no works can be produced but such as will be weak and deficient: hence it follows, that the pictures of many painters, although possessing some merit in particular parts, are yet very faulty in the composition, and execution of the whole.

In the hope of preventing such defects in the future works of art, and in order to explain and apply the rules and instructions contained in the foregoing Treatise, the following is written ; which, if properly considered, will instruct the student in painting, not only how to avoid errors and mistakes in the perspective arrangement of his pictures, but will also teach him how to attain truth and elegance in his compositions.

But before the student can derive any advantages from the instructions which are here offered to him, he should be capable of drawing the human figure with correctness, supported by an accurate anatomical knowledge of the construction of the bones and exterior muscles ; and he must also possess more than a superficial acquaintance with architecture. He should not only be able to draw the different orders of columns, and to discriminate their critical distinctions, but also be capable of applying them with propriety in all their different arrangements of colonades, arcades, porticos, and whatever other constructions his picture may require ; constantly disposing them by a regular plan, and to proportional dimensions, as shall be directed hereafter.

To these he must add a competent knowledge of Perspective, at least so much of the science as will direct him to conduct his background, and dispose the various objects in his pictures with propriety and truth \*.

Thus qualified, he may proceed to the composition of a picture, in which he must always regulate his work by the following reflections : Let him suppose that the canvas or tablet on which he intends to paint, is the proscenium of a theatre, whereon some dramatic scene is to be exhibited ; that the figures he paints are the personæ dra-

\* A painter should also learn the principles of Practical Geometry, with some of its Elements.—See Preface to Dr. Brook Taylor's second edition, page 10, 11, and 12.

mais, the back ground and decorations are the scenes, and himself a spectator, viewing the action from the best station or point of view that can be chosen.

After having selected a subject, and determined that particular point of time which will afford the most interesting scene of the fact to be represented, it is the common practice, and perhaps the best, to make small sketches of the general ideas; then of the particular groupes: and lastly, to make a determined sketch of the whole, with the back ground and the decorations suitable to the story, and corresponding with the age and country in which the event was transacted. This sketch should be made to the same proportionate measures, in all its parts, with those of the intended picture; and every part so thoroughly considered and determined, as to require no material alteration in the subsequent progress of the work.

In the execution of such sketches, the first consideration is the size and situation of the principal figure, for the magnitude of all the other objects in the picture must be governed by, and be subservient to it. When this is determined, the next consideration is the height of the horizontal line, (or, which is the same thing, the height of the spectator's eye) and this must be regulated by the following reflections. If the painter supposes himself to stand and view the action on the same ground or plane upon which the figures of the picture are placed, the horizontal line will then pass through the heads of some of the standing figures, it will even coincide with the eye of one of them. If he supposes himself elevated or standing upon a plane or ground above that on which the figures are placed, the horizontal line will then be above the figures; but if he supposes himself sitting down, or standing upon ground, or on a plane below that upon which the figures are placed, the horizontal line will then fall below the heads of the standing figures. Yet, let it be remem-

bered, that all these various dispositions of the horizontal line must be governed by the magnitude and intended situation of the picture.

The Center of the picture, or what has been vulgarly called the point of sight, is the next consideration; and this should always be disposed within the canvas, the nearer to the middle of the horizontal line the better, reckoning from the sides of the picture upon that line. As precept and instruction are best enforced and illustrated by example, the student will receive infinite advantage from examining the works, and considering the conduct of Nicolo Pouffin, who, in the composition of his pictures, is a model of perfection.

In the works of that great master, especially the Seven Sacraments, which are particularly recommended upon this occasion, he will observe the following circumstances, which will corroborate the advice above given.

Of the seven, two represent transactions in the open air, they are the Baptism in Jordan, and Christ's Charge to Peter. In the former, the height of the spectator's eye, and consequently the horizontal line, is considerably higher than the heads of the figures; the spectator being supposed to be elevated above them. In the Charge to Peter, the horizontal line passes through the heads of all the figures, except that of Christ, which is the principal, and who is elevated above the rest; by which circumstance the consequence and dignity of his person are much increased. And by this disposition of the horizon it is clearly demonstrated, that he who views the picture is supposed to stand on the same ground with the figures.

\* In the other five pictures, the horizontal line passes through the

\* The reader is requested to observe, that no examples are here quoted, but such as are to be procured in prints.

Of the Seven Sacraments there are two sets, one large, engraved by Pefne, the other small, by Audran; the latter only is referred to.

heads

heads of the figures, as well in those subjects where they are represented sitting, as in those in which they are represented standing, the former being elevated on couches, which are raised upon a floor above that on which the spectator is supposed to stand.

It has already been observed, that the disposition of the horizontal line must in many cases be governed by the form and situation of the picture: hence it follows, that in large pictures, where the heights are considerably greater than the widths, and which are to be placed in elevated situations, it will be necessary to place the horizontal line below the heads of the figures.

And this practice hath been general with the great masters in most of those pictures which they painted for altars, refectories, and such situations as were raised above the common height of the eye. Thus, in the \* Death of St. Peter, martyr, by Titian, which was at Venice, the horizontal line passes below the middle of the figures; by which circumstance, the picture acquires a grandeur which it would have lost by a more elevated disposition of the horizon. As in this case other examples are unnecessary, it will be proper to proceed to a more particular consideration of the center of the picture.

It has been already hinted in this Discourse, and strongly insisted upon in the foregoing Treatise, that this point should always be placed in the middle of the horizontal line, reckoning from each side of the canvas. Yet it may, and frequently has been placed, nearer to one side than the other; but it is very seldom that any advantage is gained by such disposition; nor can it be considered as perfectly natural, for let the painter refer to the theatrical idea before alluded to, and he will readily agree that no man will prefer a side view if he can procure a central seat.

\* Of this picture there are many prints, but the best is by Le Febre.

This

This precept is also confirmed by the example and conduct of Pouffin, who has generally placed the center of his picture as near the middle of the canvas as possible, as may be seen in the Sacraments before mentioned; although in the\* Pest or Fall of Dagon, he has placed the center of the picture rather towards one side of the tablature.

Tintoret, in his picture of the† Marriage in Cana, hath placed the center of his picture in the middle of the table at which Christ and the company are seated, and which is very much to the left of the tablature; but by this disposition he has destroyed the grandeur of his picture, and made that part which should have been the principal subject, nothing more than an episode.

Raphael, in the Heliodorus, and in the School of Athens ‡, has kept the center of the picture in the middle of the tablature; and Paul Veronese hath constantly and very wisely done the same in all his great refectory pictures. The observance of this rule cannot be too strongly enforced; for if it be not clearly understood, and carefully practised, no picture can be perfect.

It has already been observed, that the height or size of the principal figure is the first object that must be determined in the picture, and that the height of the horizontal line must be governed by it. This must also determine the magnitudes of the other figures, and of the architectural decorations, with whatever other objects are necessary to the composition; all of which must be disposed and proportioned by their relation to this figure. Yet let it be remembered, that by the principal figure is not meant the largest, nor even that which

\* The print is engraved by Step. Picart.

† Engraved by Volpato in the Schola-Italica Pitturæ, published by Mr. G. Hamilton at Rome, 1773. No. 23.

‡ Of these works, which are in the Vatican, there are prints by different engravers. Of the Heliodorus there is a fine etching by Carlo Maratti.

may



may necessarily be the most conspicuous, but that which represents the hero of the drama, or principal actor in the scene; hence it follows, that wherever this figure is placed (and his situation must be determined the first) all the rest are to be attendant on and subservient to him. Their magnitudes must be proportioned by his, agreeably to the rules and instructions which are given and explained in the foregoing Treatise: remembering at the same time, that no precise rule can be given for the magnitude of the principal figure in proportion to the tablature; for that must be left entirely to the taste and skill of the artist; only let him cautiously avoid bringing this figure too forward, nor let him remove it too very far back on the ground plane.

These instructions will be better understood by the student, if he will but examine and consider the print from Le Seur's Sick Alexander, taking the potion from his physician Philip\*.

In that most admirable composition, Alexander is the principal actor, and his physician the second; yet upon examination it will be found, that the principal figure is by no means the largest, but the contrary: for the only figures in the piece which are smaller, are the representations of two attendants in the back ground—the boys that are waiting are smaller, in consequence of their youth only; but the two friends in the foreground are by much the largest figures in the piece. It is needless to observe, that all these figures take their proportions from that of Alexander; for as he is the chief actor, and consequently the principal figure in the piece, the others necessarily take their dimensions from him.

In the disposition and arrangement of the figures, let the student be particularly careful that their situation on the picture be well accounted for, and perfectly consistent with their station on the ground plane, upon which they are supposed to stand; that their feet,

\* The print is by Benoist Audran.

although

although concealed, may yet be traced from those parts of their bodies which are seen; for since it is impossible that more than one man can stand on one point, it must follow, that no heads ought to be introduced in those parts of the picture where bodies cannot be supposed to correspond with them. This caution is not useless, for however inconsistent and absurd the practice may be, there are too many artists who seem to indulge in the constant commission of this gross error, as if determined to sacrifice nature and truth to empty show and gaudy falsehood

It is not a pleasant truth, yet it must be observed, that not every one of the old masters can be acquitted of this charge: and for the sake of demonstrating the fault, one instance shall be selected, which is from \* Dominichino, in his Martyrdom of St. Sebastian; in which he has by no means kept the figures in their † proper places; for the group of crouching figures on the right hand of the print are crammed so closely together at their heads, that the necessary space for their bodies cannot be found. Similar faults may be seen in the works of Pietro da Cortona, Carlo Cignani, and others of their class in art, but never in the works of Raphael or Poussin; on the contrary, in the pictures of both those masters, every remote part is defined with the utmost precision, as may be seen in the Murder of the Innocents, engraved by Mark Antonio, in which very small parts of the extremities are described, they being necessary to the completion of the back figures.

Although the figures are the first and principal concern of the painter in all historical compositions, yet he must remember that there are many attendant ornaments and decorations, which are absolutely

\* The print is engraved by Nicholas Dorigny; and the picture was in the Carthusians' church of Termini at Rome, but now at Paris.

† The remark here made is not intended as a general charge against that great master, whose compositions are superior to most and equal to the best masters that Italy has produced.

necessary

necessary to the perfecting of the piece ; all of which should be introduced and disposed with great care and judgment.

It is almost needless to remark, that in nature there are but two situations in which any transaction can be supposed to happen, the one in the open air, the other within doors, either in the streets or fields, or in some chamber, temple, or other edifice.

In these different situations, buildings, and architectural decorations are essential parts of the back ground ; all of which parts must correspond in their style with the age and country in which the scene is exhibited.

The style of architecture being determined, all the buildings, whether exterior or interior, but especially the latter, must be conducted in their design by a regular plan, to which the leading parts should be conformable ; and those leading or principal parts should constantly be disposed parallel to the picture, scarcely ever obliquely or inclined to it. This advice deserves the artist's particular consideration, for all oblique or inclined arrangements of buildings in the back ground, though perfectly natural, do, by their angular situation, interfere with the figures, produce an unpleasing effect, and destroy the simplicity and grandeur of the picture. Here again the precepts are illustrated by the examples of Poussin in his Sacraments, and by Raphael in his Heliodorus, School of Athens, and Cartoons \*.

In all these most excellent compositions, the architecture and buildings are arranged parallel to the picture ; the interior architecture is disposed by a regular plan, and every one of the five in-door subjects of the Sacraments exhibits a part of a chamber, or of a chapel, with such accuracy, that the whole design, might be completed, and a building erected, from either of the prints, which would produce the purest and most elegant specimen of architecture.

\* Of the Cartoons there are prints by Dorigny, Griblin, &c.

In the School of Athens, by Raphael, the general lines of the building are parallel and perpendicular to the picture, and the figures are disposed on two planes or floors: to the upper floor there is an ascent by four steps. From which circumstance it will be proper to observe, that whenever steps are necessary, they must be proportioned to the height of the figure; and this proportion must be determined by admeasurement, as follows:

Suppose the height of the human figure, to be taken at six feet, and the height of a step six inches \*; in this case the height of the step will be one-twelfth part of the height of the man; therefore in the representation upon the picture, the step should be proportioned to the figure in the same ratio: that is, if a figure be represented as standing upon or very near a step, the height of the latter should be one-twelfth part of the former. Yet it must not be supposed that the foregoing proportion is to be invariably maintained throughout the picture; for as men are of different statures, so should the figures in a picture be of different heights: therefore let the height of the nearest step be proportioned to the nearest figure, and continue the same height perspectively to all the steps that may be required in the picture.

In the same manner all those objects which must necessarily be introduced, and which may be styled the furniture of the picture, such as altars, seats, tables, and other utensils, must be proportioned to the figures by the same methods that are used in the arrangement of steps. And here the student must remember, that all such objects may be disposed in any direction to the picture, either parallel or inclined, provided they are not very large, for then they must conform to the general direction of the building. This will be better understood by referring again to the example of Raphael, in the last-

\* See Page 124;

mentioned

mentioned picture, where the figure of Epictetus is leaning on a block, which is situated obliquely to the picture.

Lastly, let the painter be careful to avoid the too common, but improper practice, of introducing in the back ground scraps of columns, pedestals, and other confused indeterminate indications of decorations, which are not connected with, nor necessary to the construction of the building, merely for the purpose of producing what some unskilful artists call effect, but which are only calculated to destroy the harmony of the piece; for such fragments not only produce a baffle and confusion in the composition, but totally destroy that tranquil simplicity which constitutes elegance, and produces grandeur\*.

In the foregoing instructions, there is no part which is useless, or which ought to be neglected by the artist, who means to produce a perfect composition; it will therefore be proper to recapitulate briefly those instructions, and to consider them as axioms from which the student must never depart.

#### First.

The horizontal line must always correspond with the supposed height of the spectator's eye, which should generally be in the same horizontal plane with the eye of some of the figures in the tablature.

#### Secondly.

The center of the picture, or what is vulgarly called the point of sight should always be placed exactly opposite the station in which the spectator is supposed to stand, and view the piece; and this disposition should always be as near the middle of the horizontal line as possible.

\* Of all the examples that may be produced, none can surpass the beautiful composition of the Last Supper, by Leonardo da Vinci, at Milan. In simplicity, correct arrangement, and solemnity of disposition, it is a model for imitation.—A most excellent print has lately been engraved from this picture by Morgani.

## Thirdly.

The \* figures should be proportioned to each other by the given rules, and their stations on the floor or plane of situation should be accounted for with accuracy.

## Fourthly.

The architecture and buildings, especially the interior representations, should always be disposed parallel to the picture; which will consequently give the center of the picture, for the vanishing point of the returning sides of those buildings.

## Fifthly.

The architecture in all cases should be proportioned to the figures, and constructed from a regular plan, so that the parts seen should indicate consistency, uniformity, and connection with parts not seen.

These rules are so absolute, that the student may be assured, if they are not strictly attended to, his figures will appear to be jumbled together like pasteboard puppets, his buildings and architecture will be false and incongruous, and serve only to evince his want of skill and poverty of taste.

The preceeding rules and instructions, although directed to the student in Historic painting, apply with equal force to the painter of Portraiture; and therefore it may be thought unnecessary to offer any advice upon the subject of portrait painting. But as too many professors in that branch apply themselves so much to the painting of a head, that they scarcely consider or understand any other part of the picture, it will not be useless or improper, to allot a small portion of this Discourse to the consideration of those parts of a portrait

\* The best way to determine the magnitude and station of the back figures will be, to sketch out the whole of their outlines over the figures that stand before them.

which

which require the assistance of Perspective, and the decorations of architecture.

The three-quarter portrait, containing nothing more than the head and shoulders of the figure, little need be said with respect to that, because the canvas is too small to admit of ornaments; consequently, they should be omitted rather than introduced. But the whole-length portrait demands consideration, because it requires as much back-ground as any single figure can claim; therefore some directions shall be given, which, if well considered by young artists, will at least prevent the repetition of those faults which have been too often committed even by men of talent and ability.

In whole-length portraits the disposition of the horizontal line should be carefully attended to. The general practice is to place it low, but this produces very bad effects, for it gives the figure a gigantic appearance, and also conveys the idea of its being placed on an eminence on purpose to be looked at.

It has been repeatedly remarked, both in the foregoing Treatise and in this Discourse, that the horizontal line constantly marks the height of the spectator's eye *who views the picture*; consequently the space between that line and the eye of the figure in the picture is equal to the height of the eye of the sitter, above that of the painter or spectator who looks at it; therefore when the horizon is very much depressed, it indicates a necessity of looking upwards to the picture, by which the bad effects before-mentioned are produced; to prevent which, the horizon should never be below the knees of the figure, if standing, and if sitting, never below the waist.

There are but two reasons for depressing the horizon. The first and best is the intended situation of the picture, which, it may be presumed, is to be elevated; the second is, the desire of keeping the head and shoulders of the figure clear of those parts of the back ground.

ground which might otherwise interfere with the face. Yet Titian, in a portrait of a child of the Strozzi family \*, hath carried the horizon through the eye of the figure; and Vandyke never depressed the horizon of his portraits so low as the moderns have done. Surely the practice of these great men is authority sufficient to enforce these precepts.

The next consideration is the disposition of the center of the picture, which is of the utmost consequence in a whole length portrait; and though the horizontal line hath been mentioned first, yet in strict theoretical order it is the center of the picture, which is the first and principal guide in the arrangement of all the objects in the back ground of every picture.

† In a whole length portrait the center of the picture should always fall somewhere in the figure, if it be single; but if a group, it will be more properly disposed by placing it between the figures; for as it is absurd to suppose that the spectator looks at any other object in the picture than that of the *representation of the personage*; it must consequently follow, that the center of the picture, or what is vulgarly called the point of sight, will constantly fall somewhere in the figure, or in the middle of the group. But nothing is more common than to see portraits accompanied by objects in the back ground, the sides of which are supposed to be perpendicular to the picture, yet having those sides drawn to points out of the canvas; thereby producing distortion in those objects, and absurdly indicating two points of sight to one picture.

The above instructions will be more enforced, when it is remembered, that all the architectural decorations of the back ground should be constantly disposed parallel to the picture, and this for the

\* There is a print of this by Valpato in the Schola Italica before mentioned.

† See Plate XXXIX. Fig. 1. Fig. 2. Page 269.



reasons before assigned in the preceding part of this Discourse : and all oblique dispositions are to be avoided, unless the figure is represented as sitting on a chair or stool, for then the sides of such seats will generally require to be inclined to the picture ; and consequently those sides must vanish in points, which are out of the canvas.

As these rules are to be considered as infallible, it will not be improper to repeat them in a summary way, that the student may impress them on his mind, as never to be forgotten or neglected.

First.

\* The horizontal line should never be depressed below the knees of the figure.

Secondly.

The center of the picture must always be somewhere in the figure, if single ; if a group, nearly in the middle.

Thirdly.

All the objects which are introduced into the back ground of a portrait should be disposed parallel to the picture ; or, if a seat or pedestal must of necessity be inclined, that inclination should be as little as possible ; and all the architectural decorations should be clearly defined and arranged by some plan agreeably to the instructions already given concerning historical composition.

Although the science of Perspective be equally necessary to the Landscape painter as to the other professors of art, yet it must be confessed that in a landscape, where there are no buildings, or such only as are extremely distant, there seldom needs any application of its rules. This assertion, however paradoxical it may appear, is yet true ; which the following observations will evince. All the objects of nature are so complex in their forms, that they can never be reduced to mathematical description ; while most of the works of art  
being

\* See Plate XXXIX, Page 270.

being formed by lines and planes upon geometrical principles, are capable of being described and demonstrated by the science of Perspective; because that science is also founded in geometry: hence it follows, that trees, rocks, and mountains, which may be styled the natural materials of a landscape, cannot be subjected to the rules of Perspective; while edifices and buildings, which are constructed by human art, can never be accurately described without a very competent knowledge of the science. But when it is admitted, that it would be vain and fruitless to attempt drawing a tree by the rules of Perspective, let it not be therefore inferred, that the science is useless to a landscape painter; for without a good general knowledge of its rudiments, he will never be able to compose a good landscape, even if the scene should be of that kind in which no buildings are required.

Before any instructions are offered on this head, it will be proper to consider landscape as divided into two classes; the first being the open prospect of the country, the second the interior views of towns: the former of these comprehending the poetic composition, and the local prospect of nature; the latter including the representation of a particular building, or of a number of edifices collectively, the last of which may be called street views.

With regard to the poetic or composite landscape, no positive rules can be given for the disposition of the horizontal line, or of the center of the picture; their situations depend on the taste and judgment of the artist. But as some general hints may be useful to the student, the following are given:

The height of the horizontal line should always be suited to the style of the composition, whether it be heroic or sylvan; and its place must be determined by the species of objects which constitute the picture. Thus if the landscape consists chiefly of rocks and mountains, it will admit of an elevated horizon; but if the composition be  
1
chiefly

chiefly of trees, then the horizon must be lowered; for rocks and mountains require an elevated station, whence they may be seen to advantage; but as the largest trees appear but diminutive when viewed from a great elevation, they consequently require that the spectator should view them from a low situation, to make them appear lofty and important in the picture. The practice here recommended is confirmed by the example of Rubens, in his landscapes; and also by those of Foquier and Artois. The former master kept his horizon high, by which means he gave an air of grandeur to his pictures, although the objects of which they are composed are seldom very interesting or dignified. The two latter delighted chiefly in woody or sylvan scenes, which abound with trees; and the horizons of their pictures are always low, and consequently give great dignity to the objects of which their pictures are composed.

In local views the height of the horizon must always be governed by the form or character of country where the view is taken; and it will often be necessary to keep it lower in real prospects, than can ever be allowed in composition; because in the former the likeness is to be preserved, and the detail of features are to be expressed; but in the latter, elegance and grandeur must be the chief pursuit of the artist.

To these observations the following general rules may be added, which will be equally applicable to all the various styles of landscape. First, the horizontal line should never be raised above the middle of the tablature or canvas. Secondly, it should never be depressed below the proportion of one-third of the height of the picture, except in views taken in very flat countries, where it will often be necessary to keep it as low as one-fourth. Thirdly, the center of the picture should always be in the middle of the horizontal line, if possible; but, as before observed, its disposition depends much on the taste of the artist.

These general rules can never be dispensed with by those who mean to tread the paths of landscape painting ; but the artist who devotes his talents to the representation of buildings, or town views, where streets and edifices are united, must not content himself with these superficial maxims : he must make himself a perfect master of Perspective, and also of the principles of architecture ; without which he cannot expect to attain excellence. To assist the student who may chuse that department, the following instructions are offered :

If the picture is high, yet narrow, it may be as low as one-fourth or one-fifth.

The town or street view must be drawn with the strictest attention to the forms and dimensions both of the ground and of the buildings, which form the prospect intended to be represented ; and the better to attain truth some kind of scale should be employed, and a few general measures taken or assumed.

The artist should also chuse his station at a point which is not too remote from common notice, and he should carefully avoid all unnatural elevations of the horizon.

But when it is recommended to employ a scale, it is not meant that real measures should be applied, for in many cases it will be impossible to obtain them ; therefore he must remark, with great attention, the proportion which the various objects in the view bear to each other, and compare those to the height of some human figure, which should be early introduced into the sketch for that purpose.

To explain these precepts more forcibly, let it be supposed that some particular street or place is to be represented ; the artist must then conduct his work by the following considerations. When the station is determined, let him well consider whether the place or object requires to be drawn on a paper or a canvas wider than it is high ; or, on the contrary, whether it will not be better described by the propor-

tion of a greater height than width ; for inattention to these circumstances will destroy the truth of the representation, seeing that a narrow space with lofty buildings, can never be properly represented in a picture that has less height than width.

When the size and proportion of the drawing or picture is determined, let him next sketch or indicate the principle or the nearest building in the place ; and let him remember, that by the magnitude of this prime object, whether it be near or distant, he must, as by a scale, proportion every other object in the picture.

The horizontal line must then be determined, and drawn at its *just height*, agreeably to the proportion of the building which is first selected ; and this line should remain till the whole of the architecture and building are defined. It will be a good method to determine the place of this line, by the height of some door, gateway, or other aperture in the building first chosen, of which the measures may, if necessary, be easily obtained.

In drawing views of streets and places it may appear needless to give instructions for the disposition of the center of the picture, since nothing but great unskilfulness in the science of Perspective, or the most careless inattention to nature, can mislead the artist in the disposition of this point. Yet there are so many absurd examples to be seen, where this point is misplaced, and often confounded with some oblique vanishing point, that it is necessary to make this a separate article of instruction ; and therefore it will be found illustrated and more fully explained in the Praxis which precedes this Essay \*.

The disposition of the objects to the picture, whether oblique or parallel, or whether a combination of buildings, both oblique and parallel, must be well considered ; for in some views the parallel situation will be the best ; in others the oblique ; but in most there will be a combination both of parallel and oblique fronts in all directions.

\* See Page 264.

Upon such an occasion it is not to be expected that the artist can obtain the angles at which those fronts are inclined to the picture ; therefore he must content himself with sketching those inclined fronts by the eye, and then carefully follow the direction of any one line in those fronts, which, when drawn to the horizon, will give vanishing points ; and those assumed vanishing points must serve him for the construction of the rest of the building.—See page 271. Plate XL.

When the view of a single building is to be drawn, the first consideration is the station whence the view is to be taken, and that station should always be chosen which will unite the most picturesque appearance with that which is most generally known : for since the representation of a particular building, or the view of any particular place, may be considered as a portrait, that resemblance will be the most striking which is drawn from that station at which it is most commonly seen.

If the building be formed of one mass, or has its parts united, like St. Paul's, or most of the cathedrals in England, the oblique view must be chosen ; but if the building be formed with wings, or composed of detached parts, like Greenwich Hospital, the parallel situation will generally be the best.

In all interior views the station is confined to some particular spots, and the parallel situation to the picture is that which should generally be preferred, for it produces the most explicit description of the building, both in its general form, and in the detail of its parts.

The height of the eye must be carefully attended to in all views, whether exterior or interior, particularly in the latter : and false or imaginary elevations should never be admitted : or if any liberties are taken, they should be in proportion to the height of the building.—For farther instructions on this head, the student is referred to the foregoing Treatise.

These

These instructions cannot be complete without observing, that all architectural fronts in street views, must be carefully proportioned by the general rules of the orders of which those fronts are composed : and the artist must not affect to despise the application of the compasses and the ruler ; for without their assistance it will be impossible to delineate such objects with truth and correctness. And those painters who do not understand architecture, should never attempt such works without the assistance of some architect to direct them.

Although this Essay be chiefly intended to assist the student in Painting, yet it may not be improper to assign a small portion of it to the service of the Architect and Sculptor ; to them, therefore, the following observations are addressed :

The Architect should always be possessed of the science of Perspective, and that in no trifling degree ; for by its assistance he will be enabled to determine with himself, and to demonstrate to others, the future effects of his designs and drawings, whenever he is employed to erect buildings.

But the practice of making geometrical or orthographical drawings, is by custom so firmly established among the architects, that little hope can be entertained of introducing any other mode of drawing their designs. Yet, in consequence of this general practice, many able men have found themselves deceived when they saw those designs executed ; while their disappointment was no more than a natural effect of the established practice : for in the orthographical or geometrical drawing, all the parts are described equally prominent and visible, as well those which recede as those which project ; but in the building, the parts which recede will appear lower than those which project ; they will even be sometimes concealed, if viewed from certain points ;  
which.

which circumstance leads to another observation, that will encourage the architect in the practice and study of Perspective.

All public buildings, particularly those in towns, are generally placed on some particular spot or situation; consequently, they can be seen only from particular stations. The architect will therefore do well to examine and consider those stations or points of view from which his building will be seen, and then conduct the design of the exterior elevation of his edifice accordingly. Yet all the precaution here recommended will be useless to him, who does not understand, or will not practise Perspective.

It may be objected, that making Perspective drawings would be attended with too much trouble, and be inconvenient to the workman; because he could not, without equal skill in the science, be able to find out the measures of the parts by the scale; but this objection will vanish, when it is observed, that in the composition of great works every method should be practised which can ensure success: and that the making some additional sketches or drawings in Perspective, although the minute parts are not determined by the absolute rules, will be sufficient; especially, if those sketches are of the parts of which there may be any doubt concerning their future effect; and in many cases this will save the expence of a model. Another strong recommendation to this practice is, that an architect labours under a disadvantage not known to the painter, which is, that he cannot alter or correct his works after they are finished; and therefore it is more particularly incumbent on him to guard against errors or mistakes by all the means in his power.

But should the advice here given be slighted, in what relates to the designs being drawn perspective, yet let the architect be assured, that he who is master of the science will possess resources by which he will be enabled to dispose particular parts of his buildings with  
such



such art, as may produce very striking and uncommon effects \*. It is true, that there are no examples of such artificial effects to be seen in this country, and but few in others, except in Theatres. Yet such are by no means impracticable : therefore this hint is offered, which may be greatly improved by the skilful architect, who is master of Perspective ; but which will be useless to him who is ignorant of it.

After having thus strongly recommended the study of Perspective to the architect, it will be proper to give some instructions in what manner it should be applied.

When the exterior elevation of a building is to be drawn, the ichnography or plan must be considered, and must direct the situation of the object to the picture. If the parts of the building are connected, or of one mass, like the Cathedral of St. Paul, or the Mansion House, the oblique or inclined position must be chosen ; but if it consists of many parts, like Greenwich Hospital, or with wings, like the Queen's Palace, then the parallel situation will generally be best ; observing never to place the center of the picture in the center of the building, but to dispose it more on the one side than the other ; by these means the representation will be more natural, more explicit, and more picturesque, than if the center of the picture and the center of the building were to coincide. The height or place of the horizon must also be disposed agreeably to the ground on which the future building is to be erected, and all fictitious or imaginary points of view are to be cautiously avoided : in short, the architect must conduct his drawing by the same principles and practice

\* In the Cathedral of Canterbury, there is something of the kind here indicated, though it may be presumed to be more the effect of accident than of intention in the architect. It is the part behind the high altar, where the tomb of Becket formerly stood ; this part, when viewed from the entrance of the choir, has a most beautiful effect.

that

that are recommended to the painter of views. It is, therefore, needless here to repeat the instructions which have been already given.

A few remarks addressed to the Sculptor shall conclude these instructions, and very few are necessary; because it is seldom that he will require to apply the rules of Perspective to his works; it is only in the construction of the basso rilievo, that he may sometimes assist his art by the rules of that science. But in this great caution is necessary, lest he should, by an improper introduction of Perspective representations, destroy the effect he means to produce.

The best mode of conducting the composition of a basso rilievo is by a processional arrangement of the figures: such as may be seen in the antique basso relievos, where all the figures range upon one line, without any additions of back ground or distance, as may be observed in those noble works \* which are upon the arches of Titus and Constantine; and which have served as examples to Polidoro da Caravaggio, in his admirable Chairò-scuro paintings; all which are corroborative proofs of the propriety of the conduct here recommended. The superior advantages of the lineal over every other disposition in Sculpture, will be seen and clearly understood, if the artist will but examine three basso relievos in Westminster Abbey, and compare their different effects together. The monument of Sir Isaac Newton, and also that of Mr. Thynne, have each a basso rilievo upon them, in which the figures are ranged processionally, without back ground or distance: both these have their proper effect. But on the monument of the Duke of Argyle, there is a basso rilievo upon the plinth or pedestal, in which an attempt is made to represent the interior view of a building; but the effect does not answer the design of the sculptor: for as the materials do not admit a distinc-

\* These works are at Rome. Prints from them may be seen in the *Admiranda Romanorum*, and in the *Icones et Segmenta Illustrium*, &c. a Francisco Perrier, commonly called Perrier's Antiquities,

tion of colours, nor produce a gradation of shadows, the distance is entangled with the foreground, producing an indistinct jumble of objects almost unintelligible, and absolutely without effect.\*

Although the sculptor be thus cautioned against the introduction of Perspective views in the back ground, yet he must remember, that in every basso relievo, the rules of that science must direct him in proportioning his figures: he must be careful not to make the back figures larger than those on the foreground, but proportion them to each other by the rules given in the foregoing Treatise. And all seats, altars, and other necessary ornaments, must in general be disposed parallel to the face of the basso relievo: in short, the work should be considered as a carved picture, divested of a back ground, and therefore the construction must be conducted by the same general laws which govern the painter in the composition of an historical picture; with this particular caution, that the horizon must always be below the heads of the figures, whether the disposition of the work, when finished, is to be above the eye or below it.

HAVING finished the instructions, which this Discourse was intended to convey, it may be proper finally to caution students in the different departments of art, against that presumption which may lead them to flight, or neglect, the foregoing precepts. But should any one, affecting superior genius, disregard the advice which has been given in the preceding pages, he will soon find himself miserably deceived; and so far will he be from producing compositions equal to the masters whose works have been selected as examples, that on the contrary his productions, though they may be sup-

\* See Observations of Sir Joshua Reynolds, in his Tenth Discourse, from page 214 to 216, Malone's edition.

ported for a short time by friendly partiality, or fashionable folly, will yet become despised and neglected; the just and inevitable fate of all attempts in art, wherein science and judgment are wanting.

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A LIST of those Publications on PERSPECTIVE, to which References have been made in the foregoing Treatise; arranged in the Order they were published.

1. *Perspectivum Pictorum, et Architectorum, Andreae Putei,\* e Societate Jesu Romæ, 1693. A Second Part, 1700, two Vols. Folio.*

A Translation of the First Part of the above Work was published in London 1707, 1 Vol. Folio. The Plates engraved by Strut. The Roman edition is in Latin and Italian; the London, Latin and English.

2. *A Treatise of Perspective, demonstrative and practical, by Humphry Ditton. London, 1712.*

3. *Linear Perspective; or, a New Method of representing justly all Manner of Objects, &c. by Brook Taylor, LL.D. and R.S.S. London, 1715. Octavo.*

4. *New Principles of Linear Perspective;† or, the Art of Designing on a PLANE the Representations of all Objects, &c. by Brook Taylor, LL.D. and R.S.S. London, 1719. Octavo. This is a Correction and Improvement of the former.*

5. *An Essay on Perspective, written in French, by William James Gravesande, LL.D. professor of mathematics and astronomy at Leyden, F.R.S. Translated by E. Stone, 1724.*

6. *The Practice of Perspective; or, an Easy Method of representing Natural Objects. Written in France, by a Jesuit of Paris; translated by E. Chambers,‡ 1726. 1st Edit. Quarto.*

7. *Stereography;*

\* Andrew Pozzo.

† This was revised, corrected, and re-published by John Colson, M.A. and F.R.S. Lucasian Professor of Mathematics in the University of Cambridge, London, 1749.

‡ Author of the Dictionary, which goes under his name.

7. Stereography ; or, a Complete Body of Perspective, &c. by J. Hamilton, F. R. S. 2 Vols. Folio. London, 1738. *Most commonly bound together.*

8. The Practice of Perspective ; or, Dr. Brook Taylor's Method of Perspective made easy, by Joshua Kirby. Ipswich, 1754. Quarto. —*Mr. Kirby also published a Folio Treatise, intitled, The Perspective of Architecture.*

9. The Practice of Perspective, on the Principles of Dr. Brook Taylor, &c. by Joseph Highmore. London, 1763. Quarto.

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11. A Familiar Introduction to the Theory and Practice of Perspective, &c. by Joseph Priestley, LL. D. F. R. S. London, 1770. Octavo.

12. The Elements of Linear Perspective demonstrated by Geometrical Principles, by Edward Noble. London, 1771. Octavo.

13. \* A Complete Treatise on Perspective, in Theory and Practice, by Thomas Malton. London, 1775. Folio.

\* A Quarto Volume was lately published on Perspective, intitled The Young Painter's Maul-stick. London 1800. By James Malton, youngest Son to the above-named Thomas Malton.

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